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Agriculture

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SELECTED CONTENTS

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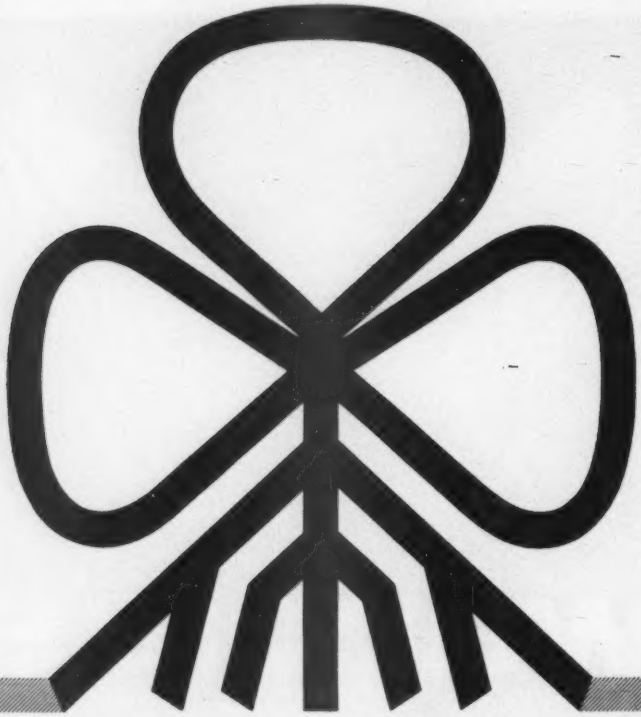

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Advisory Service

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Agriculture

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Editorial Offices
Ministry of Agriculture, Fisheries and Food
Whitehall Place, London S.W.1. Trafalgar 7711

CONTENTS

Why Fisons fed plants with radioactive phosphorus

The common isotope of phosphorus is P^{31} This is the isotope you get in fertilizer phosphorus. Fisons handle thousands of tons of it a year. But there is also a man-made radioactive isotope of phosphorus. This is P^{32}, produced when you bombard P^{31} with neutrons:

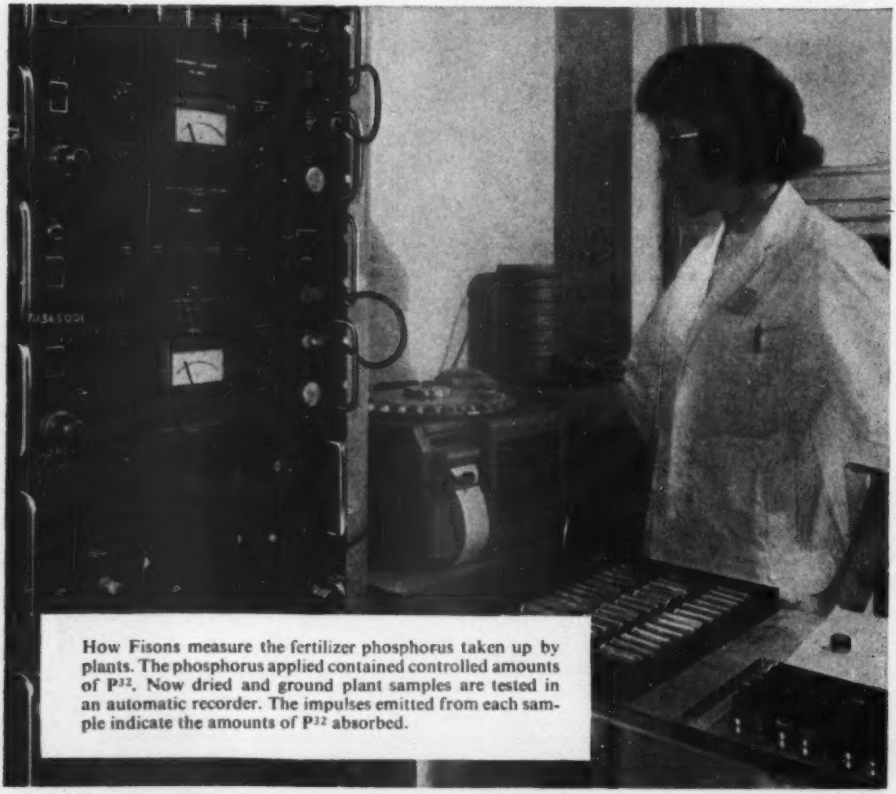
$$P^{31} + n \longrightarrow P^{32}$$

This isotope is, of course, never present in any fertilizer made available to the farmer. But in agricultural research, under controlled conditions, it can be a very useful tool. For it can be used to check the action of P^{31} in the soil and in plant tissue.

Chemically P^{32} is identical to P^{31}. Therefore they both behave in the same way. And so P^{32} can be used as a tracer for P^{31}. At Levington Research Station it is being used to measure the movement of phosphorus between the soil solids and the soil solution, and to calculate the reserves of available phosphate in the soil solids.

These studies are vital if we are to understand plant nutrition. For the soil solution holds little phosphorus. The supply must be replenished several times a day if the plants are to get enough of this element. The size of the available reserve is also important—before and after fertilizer is applied. This knowledge directly affects our control of crop production.

These studies, and related work, are being done at Levington Research Station on samples of soil from experimental sites all over the country. They are just one part of the important contribution Fisons make to our knowledge of plant nutrition and the use of fertilizers.



How Fisons measure the fertilizer phosphorus taken up by plants. The phosphorus applied contained controlled amounts of P^{32}. Now dried and ground plant samples are tested in an automatic recorder. The impulses emitted from each sample indicate the amounts of P^{32} absorbed.

WARBLE FLY

MODERN scientific development has pointed a way to the elimination of the warble fly by the use of systemic insecticides. This tiresome fly can upset the well-being of cattle and reduce their productivity during the summer months, and the grub can seriously damage and reduce the value of the animals' hides. Attempts to eradicate the warble fly by legislation under the Warble Fly (Dressing of Cattle) Order, which required regular derris dressing of the warbled animals in the spring, have failed because of the impossibility of proving whether or not animals have been properly treated as required by the Order. The Minister has therefore revoked the Order in the belief that eradication is more likely to be achieved by an intensive campaign promoting the idea that the prevention of warble infestation by treatment with systemics should be regarded as a matter of good husbandry.

The Ministry's field services will accordingly be pursuing a vigorous advisory and publicity campaign this autumn, the season when systemics can most effectively be used, and in the coming spring. A Warble Fly Campaign Committee has also been set up under the chairmanship of Mr. J. R. Fell of the National Farmers' Union. Represented on the Committee are farmers, the leather and meat trades, the manufacturers of systemic and derris products, the Milk Marketing Board, the British Veterinary Association and the Ministry.

Mr. Beesley of the Ministry's Central Veterinary Laboratory discusses the merits of these new systemic preparations on page 419.

WALTER R. SMITH
Director, N.A.A.S., Northern Region

D. A. BOYD
Rothamsted Experimental Station

These results will be studied along with the results of other trials, including some on more extensive systems of husbandry, and involving further breeds. In the light of these, and of the information about the experience of farmers in the calving and rearing of Charolais cross cattle, the Secretary of State for Scotland and I will be considering whether or not the Charolais breed should be established in this country.

Rt. Hon. Christopher Soames, speaking in the House of Commons, 22nd July, 1964

Charolais Trials in England and Wales

Interim report on comparisons under intensive feeding systems

BULLS of the French Charolais breed were imported by the Ministry of Agriculture, Fisheries and Food in November, 1961, and since 1st March, 1962, have been available for service, by artificial insemination, from cattle breeding centres of the Milk Marketing Board and private centres. The breeding of beef cattle by the use in dairy herds of beef sires of a high standard is a major industry in Britain; it is estimated that over 300,000 out of a total of one million dairy-bred stores reared annually are by beef bulls standing at A.I. centres. The comprehensive testing of the Charolais breed under British conditions therefore required a comparison of the progeny of the Charolais bulls with those sired by other breeds of bull, out of dairy cows.

The tests were sponsored by the Charolais Group which was set up in 1961 by the Agricultural Improvement Council of England and Wales. The Group recognized the need to test Charolais crosses against a variety of British breed crosses under different conditions of climate and feeding and management systems. Their primary concern was with commercial objectives—the assessment of growth rate, economy of food conversion,

carcass yield and quality, in a variety of tests, within each of which the same conditions of feeding and management could be maintained for the crosses under comparison. Farm Institute Authorities, University Departments, N.A.A.S. Experimental Husbandry Farms and commercial organizations were therefore invited to participate in the testing programme, which it would have been impossible to carry out on such a scale without their whole-hearted co-operation. In all, 41 centres from Cockle Park in the north to Dartington Hall in the south-west and Wye College in the south-east responded to this invitation and started trials during the period December 1962—October 1963. All animals used in the trials were the progeny of A.I. sires.

The full programme of trials included both intensive and extensive methods of beef production. Results from the majority of tests where cattle were reared on the former system were complete by June 1964. The results from more extensive methods of production in England and Wales will be reported later. Complementary tests are taking place in Scotland, but no results are yet available.

Scope of the report

The cattle policy of individual trial centres determined the choice of the British sire with which the Charolais sire was compared, likewise the breed of dam. In the intensive trials in England and Wales, with which alone this report deals, the only British sires that have been tested sufficiently to allow reliable individual breed comparisons with the Charolais are the Friesian and Hereford. Other sires which contributed some results are the Devon, South Devon, Lincoln Red, Sussex and Welsh Black breeds. As regards the breed of dam, most of the intensive trials in England and Wales were on Friesians, and this report takes into account only results from Friesian dams. Results from four trials with Ayrshire dams have been excluded, as the numbers were too small for reliable conclusions to be drawn.

Some of the centres used animals in their own dairy herds from which to breed calves for the trials, but the majority relied on purchased calves. All the calves were reared on restricted milk diets, in the same way as the majority of beef/dairy crosses are now reared in England. At most centres they were individually fed up to the 12 weeks' stage, but thereafter were group fed except at the few centres with individual feeding facilities. After 12 weeks the system of feeding and management was based on the intensive high concentrate method (barley beef). Charolais crosses were yarded separately from British breed crosses so that food consumption could be recorded separately. By mid-June 1964, twenty-one trials on Friesian dams involving this intensive method had been completed or nearly so, and since these provided all but a small part of the information which will be forthcoming this year on relative performance under this method, it was decided to make this interim report.

Results

The individual trial results were combined to allow a direct comparison of Charolais and Friesian sires on Friesian dams; of Charolais and Hereford sires on Friesian dams; and of Charolais sires with sires of all breeds (other than Friesian and Hereford) on Friesian dams. The comparisons can be

made separately for steers and heifers. These results, together with the general means of all the Charolais crosses and of all those sired by British bulls, all on Friesian dams, are set out in Tables 1–4. As the number of Charolais crosses and of crosses from British sires was not always the same, the effective number of pairs is given in addition to the actual numbers of animals contributing to the comparisons. The standard errors were derived from the variation within breed and sex groups of all animals at each centre; errors could not be computed for the food conversion rates, as the animals were group-fed at almost all centres.

Table 1: Liveweight and deadweight comparisons

In Table 1, the performance of the Charolais crosses can be compared with that of the British breeds of bull for the equivalent of 115 pairs of steers and 77 pairs of heifers for the following variates: liveweight gain (lb per day), hindquarters as percentage of total carcass weight, killing-out percentage, and carcass grade. The average liveweight gain per day was greater for the Charolais crosses than for the crosses from British sires by about 5 per cent for both steers and heifers. Both differences are significant. However, there was virtually no difference in rate of liveweight gain between the Charolais × Friesian and pure Friesian steers. For steers, but not for heifers, there were differences between the Charolais crosses and those from British sires in respect of hindquarters as a percentage of the total carcass weight (excluding the estimated or actual weight of kidney fat). The differences in killing-out percentage were clearly in favour of the Charolais crosses, particularly for the steers. The carcass grades, based on those used in the Ministry's grading service at deadweight centres, are presented numerically (A+ = 8, A = 7, A− = 6, B+ = 5, etc.). The Charolais × Friesian steers and heifers graded somewhat better than the pure Friesians and slightly worse than the Hereford × Friesians.

Table 2: Food conversion

There is information on food conversion rates for rather more than half the animals contributing to Table 1. For both sexes most of the available comparisons were of Charolais and Hereford sires; further information will be forthcoming when all trials are complete. Table 2 shows that the average consumption of starch equivalent per lb of liveweight gain was almost 10 per cent less for the Charolais crosses than for those from British bulls. Although it was not possible to estimate standard errors from variations between animals, as was done for the variates of Table 1, the consistency with which the food conversion data favour the Charolais crosses (at 11 out of 13 trials for steers and 7 out of 8 trials for heifers) indicates that the difference is a real one.

Tables 3, 4: Conformation, finish and quality

The carcasses were scored for conformation, external finish and quality. All scores for a single trial were made by the same person; for most trials this was the Ministry's Regional Fatstock Officer. Their assessments are necessarily subjective, but standards of assessment were made as uniform as possible by previous briefing; the pattern of results proved reasonably consistent from region to region, suggesting that the breed comparisons are genuine.

TABLE 1

Summary of relative performance of crosses from Charolais (Ch) and from British sires (Br)

Sire comparison	No. of animals Ch	Br	Weighted no. of pairs	Liveweight increase (lb per day) Ch	Br	diff.	*Hindquarters as % of carcass Ch	Br	diff.	Killing-out % Ch	Br	diff.	Carcass grade Ch	Br	diff.
Steers															
Charolais *v* Friesian	54	64	50	2·20	2·18	+·02±·038	50·9	50·3	+·6±·24	57·0	55·7	+1·3±·35	7·2	6·4	+·8
Charolais *v* Hereford	55	60	54	2·31	2·12	+·19±·036	50·1	49·3	+·8±·23	57·6	56·3	+1·3±·33	6·9	7·2	−·3
Charolais *v* Other breeds	30	32	30	2·33	2·12	+·21±·049	49·6	48·7	+·9±·30	56·8	56·3	+·5±·45	7·4	6·9	+·5
ALL COMPARISONS	112	156	115	2·25	2·13	+·12±·025	50·5	49·9	+·6±·16	57·2	56·0	+1·2±·23	7·1	6·8	+·3
Heifers															
Charolais *v* Friesian	29	20	22	2·00	1·90	+·10±·057	50·1	50·0	+·1±·35	57·0	56·7	+·3±·52	7·3	6·8	+·5
Charolais *v* Hereford	48	33	38	1·98	1·90	+·08±·044	50·5	50·8	−·3±·28	56·6	55·7	+·9±·40	6·3	6·6	−·3
Charolais *v* Other breeds	25	25	25	2·01	1·92	+·09±·054	51·2	50·3	+·9±·33	57·0	56·5	+·5±·50	7·2	6·7	+·5
ALL COMPARISONS	83	78	77	2·03	1·91	+·09±·031	50·7	50·5	+·2±·19	56·7	56·1	+·6±·28	6·7	6·6	+·1

*Not available at two centres.

TABLE 2

Food conversion of crosses from Charolais (Ch) and from British sires (Br)

(lb starch equivalent per lb l.w.i.)

Sire comparisons	No. of animals Ch	Br	Weighted no. of pairs	Food conversion Ch	Br	diff.
Steers						
Charolais *v* Friesian	23	26	21	3·38	3·53	−0·15
Charolais *v* Hereford	44	50	44	3·47	3·72	−0·25
Charolais *v* Other Breeds	19	21	20	3·24	3·85	−0·61
ALL COMPARISONS	74	97	74	3·43	3·71	−0·28
Heifers						
Charolais *v* Friesian	—	—	—	—	—	—
Charolais *v* Hereford	37	25	29	3·89	4·20	−0·31
Charolais *v* Other Breeds	9	8	9	3·73	4·45	−0·72
ALL COMPARISONS	46	33	37	3·85	4·26	−0·41

The scores were numerical. Most of them (those for conformation, external finish (evenness) and carcass quality (texture)) had a minimum of 1 and a maximum of 10; their results are given in Table 3 in the same general form as that of previous tables.

The other three variates (external finish (amount), and the two remaining scores of carcass quality) were scored for an optimum of 5, representing 'current market requirements', smaller scores implying a deficiency and larger scores an excess of fat (or, in the case of eye muscle, of colour); the percentage of the total number of animals receiving each score is shown in Table 4; for these variates, differences between the British sire groups appeared of secondary importance and separate results are not presented.

The Charolais crosses had rather larger mean scores for conformation (leg shape) than those from British sires; for conformation of loin and rump and fore-rib, the Charolais crosses had somewhat larger scores than the pure Friesians, and much the same scores as the Hereford × Friesians (Table 3).

Proportionally more crosses from Charolais than from British sires were scored as deficient in fat cover; this was true for both steers and heifers (Table 4), whilst proportionally more of the crosses from British breeds had large scores, implying that they were over-fat. Scores for evenness of finish (Table 3) were much the same for the progeny of Charolais and other breeds.

The carcass quality score for texture (Table 3) indicates a preference for the Charolais crosses compared with the pure Friesian, and, to a less extent, with the Hereford × Friesian but little difference between Charolais and the other British breeds. There was no difference between the Charolais crosses and those from British sires in respect of colour of eye muscle (Table 4) and only small differences in marbling; there were rather more animals scoring 4–6, around the optimum, among the crosses from British sires; however, the majority of the steer carcasses from both Charolais and British sire crosses were scored as deficient in marbling.

TABLE 3

Summary of carcass scores of crosses from Charolais (Ch) and from British sires (Br)

Sire comparison	No. of animals Ch	Br	Weighted no. of pairs	Conformation (leg shape) Ch	Br	diff.	Conformation (loin and rump) Ch	Br	diff.	Conformation (fore-rib) Ch	Br	diff.	External cover (evenness) Ch	Br	diff.	Carcass quality (texture) Ch	Br	diff.
Steers																		
Charolais *v* Friesian	53	65	53	8·6	7·4	+1·2	7·9	7·3	+0·6	8·2	7·5	+0·7	7·3	7·6	−0·3	8·1	7·5	+0·6
Charolais *v* Hereford	55	59	53	8·2	7·6	+0·6	7·6	7·6	0	7·6	7·5	+0·1	8·0	8·0	0	6·6	6·2	+0·4
Charolais *v* Others	42	29	31	8·6	7·3	+1·3	8·0	7·4	+0·6	8·0	7·9	+0·1	7·8	7·9	−0·1	8·3	8·2	+0·1
ALL COMPARISONS	111	153	118	8·4	7·5	+0·9	7·7	7·4	+0·3	7·9	7·5	+0·4	7·6	7·7	−0·1	7·4	7·0	+0·4
Heifers																		
Charolais *v* Friesian	26	17	19	8·3	7·3	+1·0	8·2	7·6	+0·6	8·9	8·3	+0·6	7·7	7·2	+0·5	8·9	8·0	+0·9
Charolais *v* Hereford	48	33	38	7·3	7·0	+0·3	7·2	7·4	−0·2	7·6	7·6	0	7·3	7·6	−0·3	6·0	5·8	+0·2
Charolais *v* Others	22	23	22	8·1	7·1	+1·0	7·9	7·3	+0·6	8·4	8·2	+0·2	7·6	7·9	−0·3	8·2	8·3	−0·1
ALL COMPARISONS	79	73	70	7·7	7·0	+0·7	7·5	7·4	+0·1	8·0	7·8	+0·2	7·5	7·7	−0·2	6·9	6·9	0

TABLE 4

Additional scores for carcass quality from Charolais (Ch) and from British sires (Br)

	% of animals with each score: 1	2	3	4	5	6	7	8	9	10
External finish (*amount*)										
Steers Ch	1	4	22	34	24	9	3	2	1	—
Br	—	—	5	26	43	16	3	3	1	3
Heifers Ch	—	1	15	32	28	16	7	—	1	—
Br	—	—	—	3	47	30	16	3	—	1
Carcass quality (*colour of eye muscle*)										
Steers Ch	4	—	—	1	18	20	23	26	5	3
Br	4	3	2	6	19	13	24	22	4	3
Heifers Ch	4	5	1	5	18	16	24	20	1	6
Br	8	4	—	1	23	8	22	14	3	17
Carcass quality (*marbling*)										
Steers Ch	27	24	18	9	12	4	4	2	—	—
Br	20	17	22	18	12	7	3	1	1	—
Heifers Ch	21	21	20	10	16	8	4	—	—	—
Br	3	18	21	15	22	17	4	—	—	—

Note: Number of animals as in Table 1.

THE CHAROLAIS CATTLE GROUP, under the Chairmanship of Sir Harold Sanders, includes members representing the Milk Marketing Board, National Cattle Breeders' Association, Associated A.I. Centres, Research Centres and the Ministry. It was set up in 1961 by the Animal Experiments Sub-Committee of the Agricultural Improvement Council to consider and advise upon the trials to be undertaken with Charolais bulls and the records to be collected; and to watch the progress of the trials and report upon them. Mr. W. R. Smith (Regional Director, N.A.A.S., Northern Region) is the convenor of the Group and Dr. D. A. Boyd (Department of Statistics, Rothamsted Experimental Station) is one of the members.

The authors are indebted to Messrs. W. H. Fletcher (N.A.A.S., West Riding) and A. Frater (Rothamsted), who helped in the collection and statistical analysis of the results.

3 Questions

Will poultry flocks get larger and larger? Is there a limit to their profitable size? Wherein lies the strength of the small farmer?

Dr. R. Coles

discusses the changes in

The Size of Our Poultry Flocks

It is well known that poultry flocks in England and Wales have been getting fewer in number and larger in size. To get this change over the years into true perspective, it must be remembered that before the war a little under 20 per cent of our eggs was supplied by flocks of 500 layers or more. Today about 50 per cent—and it relates to a much bigger national output of eggs—comes from under 4 per cent of our flocks.

In 1958 we had just over 3,000 flocks, each carrying a thousand or more birds, accounting in all for about 5½ million layers. Last year the number of flocks in this category had risen to around 7,000 and they carried 18 million layers. Over this same period flocks between 500 and 1,000 layers showed a small rise in both flock numbers and layers carried of about 15 per cent. But the total number of layers in flocks of below 500 layers fell from 21½ million to around 17 million, and the number of flocks from 236,000 to 180,000.

These figures show superficially an increase in the number of flocks with 500 or more layers and a substantial increase in the number of birds they carry. And at the same time a material decline in the number of small flocks (under 500 layers) with a fairly large drop in the number of layers they carry

has taken place. From this picture the popular view that our small flock-owners are being squeezed out by their larger brethren under tougher and more competitive conditions would seem to be fully justified.

Are fears really justified?

But is it? Such a conclusion is based on a narrow concentration on poultry keeping alone without due understanding that most poultry flocks are still to be found on general farms. The fortunes of the poultry industry cannot be considered in isolation from the rest of agriculture. We must recall that during the last half-dozen years agricultural holdings have *decreased* by some 30,000 farm units. This has been the result of the amalgamation of holdings into larger units, holdings lost to agriculture through the demands of roads, buildings, etc., and the reversion of land from agriculture for other reasons.

Because of the fairly even 'scatter' of poultry units among general farms, the majority of the holdings lost as individual units will have carried some poultry; and the majority of such flocks must have been small since small flocks have for some time accounted for the great majority of our flocks—and they still do. Probably 25,000 of the 'lost' holdings carried poultry and were mainly in the under-100-birds group.

Looked at in the light of this information, the 50,000 lost poultry units could well be halved if we are thinking only of those possibly squeezed out by economic pressure. Of this remaining half, most appear to be within the under-100-layers group, and their owners may have given up for reasons other than those connected with profitability.

We must conclude, therefore, that relatively few poultry keepers have been squeezed out for economic reasons in the last few years. Our bigger people have got bigger and the smaller ones have tended to be static. With little indication of a rise in consumer demand for eggs—what now?

Egg factories

A few years ago the owners of small flocks looked dubiously upon the developing 'egg factories' of 50,000 layers or so, but today all groups seem banded together to criticize the proposals for even larger poultry units. Possibly the term 'mammoth' used in this context is unfortunate; that animal was a gigantic creature which failed to survive in an increasingly competitive world. Today the fear is that the giant units will have all the competitive advantages. The establishment of flocks carrying 100,000 or more layers, and the possible or probable emergence of units with a laying population extending beyond even this size, prompts several questions.

Is it wrong for such a large unit to exist? Is our definition of 'wrongness' related to standards of efficiency or sociological considerations? If the latter, the criticism is that the huge factory unit is not farming as we understand it. But is that understanding based on the thinking of the late nineteenth century or the latter half of the twentieth? Are the critics in effect saying that this country should have a minimum number of farmers or farms and that no field of agricultural specialization should become too specialized? If this is indeed the real grounds for criticism, then this is no basis for speculation on matters of farming efficiency, but one for the country's decision on whether or not the farming community should comply with certain pre-determined social conditions.

One difficulty here is that the trends observed are happening in many other countries. If similar conditions are not imposed on them, do we gradually fail in competition to supply the British public with food, does the country guarantee an income to 'fossilized' British farming, and do we opt out of what is now described as modern agriculture?

Among other methods bruited in the Press as a means of checking the rise of the large unit, we hear of some kinds of quota—presumably a limit on the number of birds per acre or per holding. We have had some post-war experience of the consequences of feedingstuffs quotas for farms. For some time the Dutch had a limit on layers relating to the size of holding. This has now been given up to allow their farmers to take advantage of what is described as technical advances. Others have enlarged on the restrictive effect of quotas in industry; their conclusions being that little improvement can take place under such an imposition.

Limit to scale economies

Another question asked is whether the large unit will be economically viable. The blunt answer here is that if it isn't, it will soon cease to exist. But it is interesting to speculate on the future of large units, particularly since no country—not even the U.S.A.—has yet reported a poultry plant of a million layers. Is there any sinister reason for this? Our American cousins have a strong predilection for size!

It is assumed that the huge plant will be fully integrated; i.e., it will hatch its own stock, mill its own food and pack its own eggs. The profit margins of each process will certainly lower production costs of eggs *if* all profits accrue to the egg production unit. But these other activities need capital, and in the final event the total return from the whole venture must be considered as the investment return on the total capital invested in all processes. It is also assumed, with reason, that the very large unit will of itself reduce costs well below the average. But we should speculate about that stage when scale economies (decreases in costs resulting from size) begin to taper off and conceivably begin to show a reverse tendency.

Judged on a limited amount of work in the U.S.A., it seems that scale economies in capital costs cease and show a reverse after an area of 13,000 sq. ft is exceeded—i.e., the equivalent to about 35,000 layers in cages. The change point for operational costs may be at a much later stage as size increases. If the American figure for the size of one house is about correct, how many houses at one location can we have until the scale of operations begins to *increase* operational costs per bird? If the size of the series of houses is such that manpower or motor-power in delivering food or collecting eggs is beginning to show a great deal of 'dead' walking or 'dead' mileage, then size in this respect is not a factor in reducing costs. Disposal of vast quantities of poultry manure and the control of disease are other difficulties to face. It is perhaps significant that in the U.S.A. only one person now seems interested in achieving the million-bird plant.

Some of these problems, however, will not relate to the owner whose large flock is dispersed among several widely placed units. And we may ask ourselves whether the costs of one such group of several thousand birds will be lower than that of the, say, 50,000-bird plant, even if the owner of the former has many widely scattered units of this calibre. There will be certain common services among the group, but to some extent these are offset by additional charges resulting from travelling from one point to another.

Undoubtedly there are those who will look with hope for every probable (and some improbable) grounds for failure by the large unit. But on grounds of efficiency—and efficiency has been urged on British farming for eighteen years—can one level fair criticism where high efficiency is manifestly achieved?

Admittedly one can hardly expect those who feel they may be squeezed out to share this enthusiasm. What we do not know (and this must still remain a matter of theory) is at what stage scale economies cease to exist. The decline in American interest in the very large unit suggests the figure there, at least, is short of a million. Why, too, the over-facile assumption that the man with 3,000 birds or less will find the million-bird unit tougher competition than the 30,000 unit? The latter has not so far knocked out the efficient 3,000-or-so bird owner exploiting his own advantages. In point of fact the flocks in the latter group have increased.

Flock size and profit per bird

So far, too, the economists have not found a clear correlation between flock size and profitability per bird. While the large unit may very well see a decline in *costs per bird* as the unit becomes bigger (at least up to the undetermined stage), this is not to say that output, and so *income per bird*, will remain static or improve. Experience has often shown that as the flock size increases, production levels begin to decline. No doubt this is the direct effect of management becoming less effective as one man looks after a greater number of birds. In consequence the smaller flock owner, with higher costs per bird but greater income per bird, has often managed to show greater profit per bird than his larger competitors. What will be interesting to see is whether the giant unit can reduce costs sufficiently to offset the disadvantage of a lower egg output per bird. Admittedly the big man may not be subject to a lower output per bird than the smaller man, but this is the usual consequence of greater flock size.

We are sure to see further changes in the flock structure of this country. But without further knowledge it would appear unwise to anticipate a tremendously dramatic change—or to hope, without real grounds for that hope, that changes will not occur.

Dr. R. Coles, M.Sc.(Agric.), M.Sc. (Econ.), B.A., Ph.D., D.Sc., is the Ministry's Chief Poultry Advisory Officer and a past President of the World Poultry Science Association.

This was in Chard, Somerset, but it could be yours

Every farmer owes it to himself and his family to be

Fully Insured

says **R. T. D. Wilmot**

Secretary, British Insurance Association

'THERE are already enough inescapable risks in farming without taking on any more that can be side-stepped by paying an annual premium', one farmer said recently. Certainly more up-to-date methods in the industry—the use of complicated machinery, electrical equipment, chemicals and the presence of inflammable liquids on farms—have brought with them increased risks, against which the wise farmer will take out insurance.

It will enable him to provide for loss of, or damage to, his property by fire and lightning, his vehicles and his stock by accident and third party risk and his machinery by breakdown. Insurance also takes care of claims by the public and other farmers for injury to them and damage to their property arising from his farming activities.

He can cover himself in respect of his legal liability to his employees, provide a pension scheme for them and insure his own life to provide for his dependants after his death.

Fire is a hazard that the farmer has always had to face and is, perhaps, one against which he sees the most need for insurance. He is naturally reluctant, however, to insure fully on an annual basis when he knows that only at harvest time will his agricultural produce be worth the full sum insured. For this reason, fire cover on produce is usually subject to what is known as 'the special condition of average'.

Fire and your produce

This has been designed to protect the farmer against having to carry more fire insurance than he normally needs in order to be sure he is fully protected at harvest time. In practice, it means that he should insure his produce for not less than three-quarters of its peak value.

Suppose, for example, his grain and feedingstuffs reach a peak value of around £10,000—and that during the peak period a fire destroys £2,500 of his grain in store. If he is insured for three-quarters of the peak value figure, the insurance company's liability will be the full £2,500 that he claims. But if he has taken out insurance, say, only three-fifths of the total value, then he will be paid only three-fifths of his £2,500 claim.

A loss of the entire peak value is highly unlikely unless all grain and feedingstuffs are stored in one place, but if this is the case, insurance on the full value should be taken out. There is also another aspect of 'the special condition of average' that must be looked at with care. It sometimes happens that yields are higher than estimated or there is a carry-forward of grain from the previous year, and in this case the protection given by a policy subject to the condition may be inadequate.

While it is true that insurance will make good the loss that might occur through a fire, it will not make up for the worry and inconvenience caused and the wastage of human effort and skill that results. The precaution of taking out an insurance policy should, therefore, be combined with an awareness of the dangers and care to see that fires do not begin.

Your animals

For the dairy farmer or stock-breeder with a valuable herd, the so-called 'Livestock policy' is advisable. This form of cover recompenses the owner for death of the animals from accident or disease. It includes slaughter for humane reasons, even though the accident or disease may not itself cause death, but it does not include statutory slaughter following an outbreak of foot-and-mouth disease, as compensation in that case is, of course, already provided by the Government.

Designed to help the farmer overcome the financial worries of this misfortune is the 'Foot-and-mouth consequential loss' policy. The objects of this are to cover lost profits on milk, beef and other products and payment of continuing expenses such as wages, rent and rates.

Capital should be free to finance the urgent task of building up the herd again, and therefore the amount insured by the policy must be sufficient to keep the farm running. Often this amount is 25 per cent of the Government compensation, and many insurances are based on this figure. But cover is available for higher amounts, and a farmer is well advised to make certain that he is adequately insured.

A number of other very inexpensive livestock policies are also available, each designed to cover a specific contingency, according to the farmer's

particular needs. In this way he can cover such risks as animals killed by electrocution, loss of sheep through worrying by dogs, death of bulls while being castrated and cows while being dehorned (provided, of course, this is done under a veterinary surgeon's recommendation).

Cattle trespass must be an event with which farmers are already too familiar. It is worth knowing that they can insure against legal liability for damage that might be caused by animals straying on to other farmers' land, and also that this cover includes legal liability for claims arising from a straying bull which serves another farmer's pedigree heifer.

Liability insurance

Many claims arise through crop spray drift and the spread of fires started to burn straw or hedge clippings. The frequency with which damage is caused in these ways indicates how unexpected the possibility usually is, but they illustrate only two ways in which the farmer can find himself liable for heavy claims—and they emphasize the need for adequate insurance against them. It must be wide enough to provide sufficient indemnity to cover his other potential liabilities, such as claims arising from the existence of deleterious matter in milk and those by his employees injured while working outside the area of his own farm.

From the employer's liability point of view, machinery is the most common cause of accidents. Clothing is caught in power take-offs, serious injuries are caused by circular saws, and tractors turn over. The farmer is a businessman as well as an agricultural expert, and it is strange therefore that most have less insurance per head than any other group of business men. Under-insurance—or a complete lack of it—is a highly risky and possibly costly matter.

Every year, many agricultural workers are killed or injured through tractors overturning. Adequate insurance will cover an employer against liabilities incurred as the result of such accidents

Under-insurance

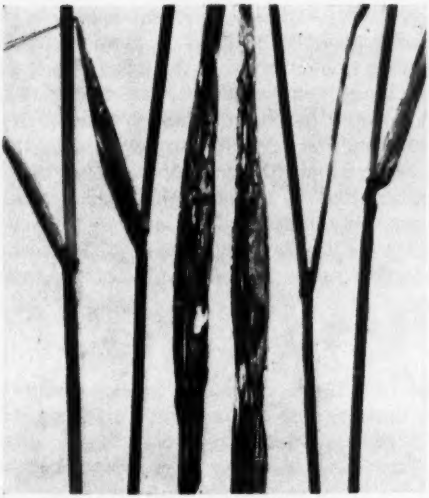
One of the farmer's greatest difficulties, from the insurance point of view, is estimating the value of his livestock, crops and buildings. From the high-tide of harvest time to the comparative slump that follows in the winter, the value of his stocks can fluctuate enormously, and farm buildings—particularly outbuildings—are frequently insured for their pre-war value. A false sense of security is felt until a serious claim is made, when the insurance payments do not provide adequate compensation for all that has been lost. The only safe-guard is to make sure that all property is insured for its full present-day value. Implements and machinery, too, should be fully insured, especially if they are kept together in sheds or barns—the sort of concentrated risk which could mean the destruction of all the farmer's machinery in one blow.

Plant diseases display a continually changing pattern. The conquest of one is often the opportune moment for another to become prominent

Leaf Blotch of Barley

D. A. Doling

In recent years mildew-resistant barley varieties have become available to the farmer and leaf blotch, a fungus disease caused by *Rhynchosporium secalis*, has become much more noticeable on the mildew-free leaves. Winter-sown crops have been the more severely infected, but extensive symptoms have also been seen on spring-sown crops, particularly in Dorset, Devon and Cornwall. This year leaf blotch has severely attacked spring barley crops in all the southern counties.



Typical lesions of leaf blotch on leaf blades and leaf sheaths of barley

Pale-grey oval spots with purple-brown margins develop on the plants at all stages of growth. As the number of lesions increases, their outline becomes irregular and the centre of each spot turns a pale brown. The lesions are most conspicuous on the leaf blade, but they develop on the leaf sheath and, characteristically, at the junction of the blade and sheath. Under favourable weather conditions the disease progresses rapidly; the leaves turn completely brown and wither and may prevent the ear emerging from the flag leaf. The earlier the foliage is destroyed the greater is the reduction in yield. This may be as much as 30 per cent of expected yields and the produce will contain a high proportion of tail corn.

Encouraged by warm and moist weather

Air temperature and humidity are the major factors controlling the development of this disease. Its preference for warm, humid conditions explains why leaf blotch becomes severe in counties to the south and west of Hereford-Hampshire. It is found on young barley plants throughout the British Isles, but the drier conditions of East Anglia and the cooler temperatures in the north are less favourable to the disease and it fails to gain a hold on the developing plants.

The fungus lives on plant debris as well as in living tissue. When the air humidity is high spores are formed and these are splashed from plant to plant by bouncing raindrops or are carried in water droplets to neighbouring crops.

Results of changed farm practice

The survival of the fungus throughout the autumn and winter has been made easier by changes in farm management. Barley is replacing oats in the south-west and crop rotations are being shortened or eliminated. The greater intensity of cereal growing has encouraged the use of combine harvesters, which scatter all the straw over the field, and has stimulated interest in winter

sowing. The cultivation of the newer barley varieties possessing resistance to mildew has provided more green leaf throughout the life of the plant on which leaf blotch can develop without having to compete with the mildew fungus.

All these factors have meant that, in the south-western counties, with their favourable weather conditions, the disease has been able to live on barley crops for a longer period of the year and has been able to spread from the infected stubble to the succeeding barley crop with comparative ease.

Seed-borne infection, has been reported in Canada, and some grasses (couch, Brome, fescue, timothy) and rye are attacked but only by different specialized forms of the fungus which are unable to infect barley. The barley form itself, however, varies considerably and at least eight physiologic races have been distinguished in England.

Choose varieties carefully

Barley varieties recently included in N.I.A.B. trials differ in their susceptibility to leaf blotch. Of the winter barleys, only Dea and Jumbo show good resistance, whilst Pioneer has more resistance than most of the other varieties. Of the spring varieties, Cambrinus was very severely attacked in both 1962 and 1963, and its low yields in the south-west trials may reflect its susceptibility to this disease and its unsuitability for that region. Rika and Proctor are both susceptible to leaf blotch and may suffer severely if autumn sown.

At the moment the choice of resistant varieties is limited. But already breeders are taking account of this disease, and the Cambridge Plant Breeding Institute amongst others are now including resistance to the leaf blotch fungus in their breeding programme. To provide more immediate help, the N.I.A.B. is collecting data from trials and demonstration plots in order to assess the relative susceptibility of barley varieties already recommended or currently in trial. Farmers in the south-west must now take leaf blotch into account along with all the other characters when choosing which barley varieties to grow.

Meanwhile, attention to cultural practices can help to reduce the severity of leaf blotch and thereby minimize losses in yield. Continuous barley growing, early sowing, high nitrogen top dressings and areas of frequent sea mists or high humidity pockets are all factors which encourage leaf blotch and therefore should be avoided where possible.

Obscure in origin, the Pietrain breed has had a swift rise to favour on the Continent. Has it anything to offer our own industry?

The Pietrain Pig

PIDA's importation

J. White

ALREADY in this country there are a great many breeds of pig. PIDA's decision to import yet another one, the Pietrain, might therefore, on first thoughts, seem unnecessary. Indeed, some people have been more than surprised and critical of the importation. They believe that, with the large reservoir of genetic material we already possess in our own breeds, there cannot be anything more in the Pietrain. This is a pertinent criticism and this article, besides being an account of PIDA's plans for testing the pig, also gives some idea of the reason for the importation.

Its short history

The Pietrain breed has a very short recorded history but it is known that it originated in the 1920s near the small town of Pietrain in the Brabant province of Belgium. Nothing, however, is known of the original breeder, nor of the breeds crossed to produce the Pietrain. It is indeed surprising that, with a breed so recently developed, the closest investigations have failed to reveal its origins. The breed probably emerged, quite fortuitously, as a result of the haphazard mating of strains of several different breeds. No doubt numerous types were first produced and, by crossing these (probably by chance in-breeding) the breed was fixed. Although we may have all the parent breeds at our disposal in this country, the chances of repeating such a crossing to produce a pig having a similar combination of genes to these of the Pietrain are remote in the extreme, if not impossible.

For some reason or other the Pietrain breed made little progress and was virtually unknown outside Belgium until the 1950s. It was then officially recognized as a breed by the National Federation of Pig Breeders in Belgium. Since then it has spread swiftly throughout Belgium and into all Western European countries.

The dark patches on a greyish skin, which are characteristic of the Pietrain pig, are clearly shown in this picture

Its appearance

The Pietrain is quite unlike any of our British breeds in appearance. Its skin is greyish with dark patches, rather like the old Oxford Sandy and Black. The first impression is of rather short, very round fat pigs, carried on fine-boned legs. It is exceptionally wide across the back and rather short. The hams, middle and shoulder are exceptionally well developed and the overall appearance is fat looking. But when handled the pigs are found to be firm and muscular all over.

Its qualities

The real merit of the Pietrain, perhaps its only great merit, is that it is an exceptionally meaty pig. The eye muscle is usually very large and well-shaped. The shoulder is wide and heavy but full of lean meat. But the really outstanding feature is the size and excellent shape of the ham. This is really large, well-formed and round. In overall lean content the Pietrain has a decided superiority over the other breeds in Belgium and France, and butchers in Belgium pay a substantial premium for pigs of the breed.

In other respects the Pietrain has few or no advantages over our own breeds. So far as food conversion is concerned, it compares favourably with all other Belgian breeds, but it seems to be a rather slow grower, and litter size is, if anything, slightly smaller than the average in this country.

Arrangements for importation

The breed's fame brought it to PIDA's attention several years ago. In May and June 1960 two parties from the Authority went to Belgium to see the breed at first hand. Impressions were unanimously favourable. The breed, because of its meatiness, was felt to have the possibility of making a real contribution to pig improvement in this country.

It was therefore decided to ask the Ministry of Agriculture to permit a number to be imported for controlled experimental purposes. This permission was granted earlier this year, and in May a buying party went to Belgium. Ninety-three pigs were bought—27 boars and 66 gilts. All the pigs had been examined for tuberculosis, both avian and mammalian, also for leptospirosis and brucellosis. After a month's quarantine in Belgium they came to this country, where they were in quarantine for a further month. The 84 surviving quarantine were then sent to various centres for testing.

It should be emphasized here perhaps that the pigs were imported for experimental purposes only. They are all under PIDA's control. The question whether the breed should be made more generally available in the country will be considered only at the end of the experimental programme, which may take three or four years to complete.

Experiments at ABRO . . .

The pigs will be tested at a number of centres. In this way the disease risk will be spread. But the principal aim is to ensure that a really comprehensive assessment of the breed is made.

The main centre for testing the pigs will be at PIDA's station at Stockton-on-Forest, Yorkshire, which has been made over to the Animal Breeding Research Organization of the A.R.C. Dr. J. W. B. King is to be in charge of crossbreeding experiments there which will begin this year.

Large White, Essex, Landrace, Wessex and Pietrain boars will be crossed with a control strain of Large White females and their progeny assessed at slaughter weights of 130 lb and 200 lb when fed on two different protein levels.

Another centre will be at ABRO in Edinburgh, where a rather similar experiment will be carried out. There, the Pietrain will be part of an experiment in which Large White, Landrace, Lacombe, Hampshire and Pietrain boars are crossed with Large White females and the progeny taken to bacon weight. There will be a further separate experiment at ABRO to compare (Pietrain × Large White) cross-bred sows with a number of other first-cross sows.

. . . and at Walls

Messrs. T. Wall and Sons (Meat and Handy Foods) Ltd. will also be co-operating in the trials. They will be testing the breed at their testing station at Tring and at their research farm at Thanestead. At Tring, four Pietrain boars and sixteen gilts will be used. Each boar will be mated to four of the gilts and the resulting litter will be put through the progeny testing station to give a direct comparison with British breeds being tested there. Two gilts from each litter will be taken off testing at 140 lb and later mated to one of the four boars (not their sire). From the resulting litters the male offspring will then be performance-tested and at least two of their sisters will be sib tested.

The whole programme will be repeated so that each of the four boars will be progeny tested for food conversion and speed of growth, lean content and damming over eight litters from eight different Pietrain dams. Each of the original Pietrain gilts will be fully recorded over two litters. All Pietrain carcasses which are dissected will have their right side studied and sampled

for suitability for fresh meat, curing and processing, and particular attention will be paid to the question of pale, watery muscle.

At Thanestead there will be two Pietrain boars and eight gilts. Each boar will be mated to four of the gilts and the litters will be fully recorded for cost of weaner production. The boars from the litters will then be performance-tested and the gilts sib tested, with a minimum of two for dissection.

Following this, the best pigs will be fully tested for use in cross-breeding programmes, both as a first cross and as a part of a three-way cross.

Arrangements have also been made for some of the breed imported into this country to be tested at Wye College in Kent.

An open mind

From the above synopsis it will be seen that the breed will be examined in a variety of ways, both pure and cross-bred, at a variety of different weights, and the carcasses will be subjected to a very thorough examination at the end of each test. Such an extensive method of examination has been chosen because PIDA has a completely open mind as to what use the breed may eventually be put in this country. The Authority has no pre-conceived notions about this at all. The first thing is to test the breed alongside our own native breeds and see how it compares and whether it is going to make any useful contribution to the industry in this country.

One thing is sure; the Pietrain breed has now been imported into every Western European country. These countries are competitors of ours now and may be even more so in the future. We cannot afford to lag behind in examining the possibilities of this Belgian breed. And, if it proves to have real merit in any particular direction, we must exploit it to the full for the benefit of our own industry.

The author of this article, **James White**, is the Chief Livestock Officer of the Pig Industry Development Authority.

Systemic Insecticides against WARBLE FLY

W. N. Beesley

THE Warble Fly (Dressing of Cattle) Order of 1948 has been revoked. You will remember it required that an approved derris dressing should be applied to the backs of warbled cattle at approximately monthly intervals during the period 15th March to 30th June. But farmers were generally neglectful in carrying out these requirements, for the collection and treatment of animals on several occasions during the period was a time-consuming and arduous task, particularly where out-lying cattle were concerned. The Order was revoked not because this treatment is ineffective but because in practice it could not be properly enforced.

Hope is now centred upon the voluntary widespread use of modern systemic insecticides. The first of these preparations was given by mouth, but modern systemics are applied to the skin, through which they are absorbed into the blood stream, killing migrating warble grubs well before they reach the back to produce the so-called 'butchers jelly' or to make their breathing holes through the skin. One such preparation, 'Ruelene', is simply poured on to the back along the line of the spine; another preparation, 'Dyvon' is poured on to the back and spread with a single sweep of a brush.

The systemic approach to warble control means that cattle can be treated soon after the flies have ceased laying their eggs, and the companies which market the above products recommend treatment in the autumn or early winter. It is perhaps convenient at this stage to think of the newly parasitized

'Ruelene' is the trade name of a product made by Dow Chemical Co. (U.K.) Ltd. It is available from veterinary surgeons as 'Chloromidate'. Marketed by Walter Gregory & Co. Ltd. as 'Hypolin'.

'Dyvon' is the trade name of a product made by Farbenfabriken Bayer, A. G., and is marketed by Cooper, McDougall & Robertson Ltd.

animal as a 'closed box' containing young developing warble maggots. Normally, no new infection can take place after about August or September in any one year, and so destruction of the maggots after this time cannot be followed by any reinfection and subsequent hide damage for a further year. Any warbles which in the spring develop in the backs of cattle already treated with systemic insecticides can be treated with either derris or, again, with a systemic insecticide.

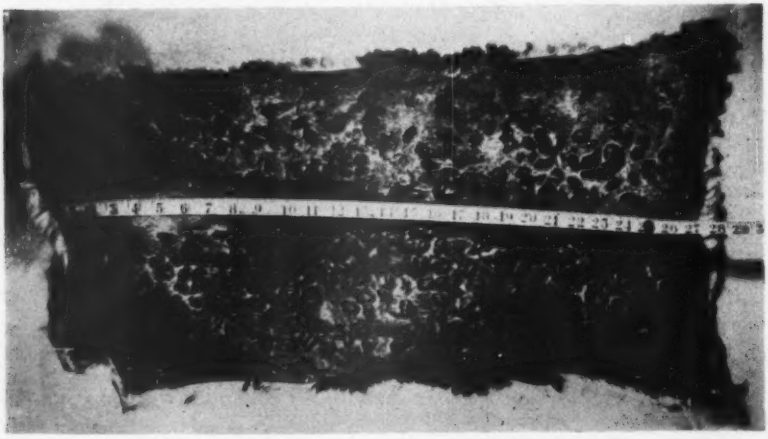
The damage which warbles do tends to be either overlooked or disregarded by many farmers—and this is to do themselves a disservice. Warbled cattle certainly give less milk and less meat than do normal, healthy animals. When the fly attempts to lay eggs it causes the panic-stricken 'gadding' of cattle, and this can lead to their entanglement in barbed-wire fences or falling into ditches. Sometimes the animal also suffers internal damage caused by the activities of migrating grubs, especially around the gullet and spinal cord. Extensive areas of jelly form in the muscles of the back under the mature warbles, and this 'licked beef' or 'butchers jelly' has to be trimmed off at the slaughterhouse—a further source of loss.

Then there is the loss suffered by the leather trade because of the breathing holes made in the skin by the warble grubs. The wounds usually heal externally in 3–4 weeks, but they may remain open for a much longer period. Unfortunately the holes are concentrated in the mid-line of the back, from which comes the 'butt' leather used for making shoe-soles. In this way individual hides may lose perhaps 3*d.* per pound—say 15*s.* on a very 'grubby' 60 lb hide. Plainly, such losses soon accumulate to hundreds, even thousands, of pounds.

Correct timing

Without question, systemic insecticides can give good control of warbles, but there is nevertheless a chance of harmful side-effects, either from the nature of the drugs used (which may be toxic for man and animals if misused) or indirectly from killing warble larvae. For example, it has been suggested that larvae killed while in the spinal canal may release substances which may

The skin of a warbled beast from the inside. The grubs grow to about 1 inch in length and from February-March onwards they begin to pierce the skin of the back, causing boil-like swellings



The 'pour-on' technique

seriously injure the animal. *It is for this reason that systemic insecticides are best used in October or November*, so that young larvae may be killed before they have even reached the spinal canal (and well before they have begun to damage the hide).

Alternatively the insecticides may be used in March or April: this late treatment has the disadvantage that there has already been some damage to the skin, but on the other hand the insecticide will have been used in the most economical way, for only the cattle seen to be infected need to be treated.

Research goes on

New systemic insecticides are continually being investigated, and some of them may soon be in use in this country. Current research is concerned with the evaluation of systemic insecticides which are effective by the low-volume high concentration 'pour-on' technique. One drawback, however, is that under certain conditions the organic solvent used to dissolve the insecticide may produce skin irritation. Care must also be taken with concentrated dressings not to overdose animals.

Nevertheless, despite such problems this new class of insecticide is already making a definite contribution to the control of insect pests of farm animals. The new materials are at present still rather expensive, but the trend is towards cheaper and less toxic compounds, with an even wider range of activity against insect (and worm) parasites. There is no doubt that the warble fly nuisance can be eradicated from Great Britain if every farmer can be persuaded to adopt a yearly dressing with systemics, as a simple measure of good husbandry.

W. N. Beesley, M.Sc., Ph.D., F.R.E.S., has been entomologist at the Central Veterinary Laboratory, Weybridge, since 1957, and has worked mainly on ox warble fly, sheep blowfly and poultry mites. Before joining the Ministry he spent three years at the Liverpool School of Tropical Medicine, and two years in West Africa studying the control of fly vectors of human disease.

Forethought in the organization of orchard labour will increase productivity

A FINE CROP OF ELLISON'S ORANGE

Fruit Picking

E. S. Devine

FRUIT production costs can be divided into those related to the actual production of fruit, and those related to all harvesting and handling operations. It is with the latter that pre-production planning, giving greater productivity per man-hour, is possible.

The operator performance per hour in output of picked fruit is influenced by the following factors: the capacity and shape of the picking container and its location on the worker's body; the size and shape of the tree and on the method of pruning; and the layout of the storage containers in the orchard (this is of prime importance if large capacity containers are used).

How to pick

The motion pattern of the picker is important, and therefore it is worth considering what kind of picking container is provided. From studies that have been made it is recommended that the picking container should be slung from the body by a shoulder harness, it is best located in front of the body and the most desirable capacity is 26–28 lb; emptying should be done through an opening at the base of the container.

Other, less effective picking containers gave a reduction in work of 10 to 15 per cent. The capacity of the container should always by used to the full. Time spent walking with a half-empty container is time wasted.

What is the best method of picking? There are four to choose from: (1) One hand picking, one hand idle; (2) One hand picking, one hand receiving; (3) Both hands picking, simultaneously; (4) Hands picking, alternately.

Of these, method 4 is the most productive, method 3 next. In methods 1 and 2 it is only possible to obtain 40 to 50 per cent of the operator's potential output. Method 4 gave a better performance than 3 because the operator had less concentration. All these comparisons were made from ground picking measurements; it is extremely difficult to obtain continued high performance from ladders or even on steps over six treads high.

Two interesting points arise from this work—the need for standardization of the picking container on the holding, to cut out operator discontent as well as having the correct capacity unit for the task, and the need for regular operator training for a few minutes each week, to maintain good operator performance, and good quality control over fruit being picked.

Tree size and the picker

The effect of tree size on operator performance is another point worth considering when planning further orchard planting. In the following table this effect is shown in terms of productive and non-productive times and clearly illustrates the adverse effect which ladders have on performance.

Tree dimensions (ft)	Crop		Productive time %	Non-productive time %			Time per apple man/min
	Wt/lb	Nos.		Ladder	Emptying	Walking	
8·17 ft tall 12·5 ft wide	121·6	551	87·26	Nil	5·92	6·54	·026
11·1 ft tall 16·00 ft wide	214·3	1,009	80·73	7·64	5·11	6·55	·029
12·5 ft tall 19 ft wide	270·8	944	78·46	9·74	4·70	6·97	·028

The size of fruit, count per 40 lb unit picked also influences performances, as can be seen in the second two sets of figures. The greater the tree height, the poorer the performance of the picker—again mainly due to activities associated with ladders; the 24-ft-tall tree has a ladder time equal to one-third of total orchard time!

The effect of pruning is that the newer umbrella-type head makes 'ladder setting' difficult, whilst the not-so-popular 'delayed open centre' has the lowest ladder figure.

The layout of the storage container has a marked influence on the picker's productivity. The amount of time spent walking to empty and getting back into work on a method-studied M II Cox layout of 24 ft × 24 ft is in the order of 4½–5 per cent; on the badly-organized layout, particularly with large containers combined with a light crop, this percentage may be increased to 20 per cent of total time.

Handling the empties

The handling of harvested fruit can be divided into the make-ready and the put-away operations. Under the first comes the handling of empty containers, and here the movement of both loose and palletized bushel boxes, together with bulk bins, requires examination. The second operation is the handling of full containers from the orchard to storage; and this includes clearing the containers from the work areas, plus either reloading to trailers or direct movement to stores.

In the handling of either empty or full containers, three distinct activities occur; (*a*) loading the transport vehicle, (*b*) travel to and from the orchard, and (*c*) unloading the transport vehicle. Loading and unloading performances per operator hour will be a reflection on the method being used. Travel time, a non-productive activity, is controlled by the type of transport, its capacity and basic function, and by ground conditions. Ground conditions and load stability can dictate the performances possible by the operators engaged on this work.

Here are figures which, excluding travel, give comparisons in time and percentages of saving between three methods of getting empty containers to the orchard.

Labour content/1,000 bushels

Method	*Container*	*Time/min*
1	Bushel boxes singly	147·84
2	Palletized bushel boxes	89·62
3	Bulk bins	67·83

Savings in time

Method 2	39·38 per cent over Method 1
Method 3	54·05 per cent over Method 1
Method 3	24·31 per cent over Method 2

Method 3 will give an even greater saving if the travel time is included, as here load stability makes for greater forward speed.

The correct placement of bins or pallets is essential. In the 24 ft × 24 ft planting the pallets should be placed in the between-tree recesses at 45 deg. to the line of the tree row being picked. A planting of 18 ft will necessitate an angle of 20 deg. to the line of trees. In the more densely planted orchard, with up to 15 ft inter-row spaces, the bins must be either handled along the rows (the pickers using either a tractor or a small propelling unit) or the containers are left at cross-paths some 40 yards apart.

Filling bins

Where pickers fill bins it is essential, even in the wider plantings, to reduce walking to a minimum. The difference between a correct and incorrect technique can be a 12 per cent production loss—all due to excessive walking.

As a general rule in bin filling, the pickers must be encouraged to work a system where they use one bin to not more than four trees, then either move the bin, using a small transport carriage, or move on to the next bin leaving a tractor driver to bring up the part-filled unit. The following table shows the effect of tree density and tree yield on bin movement if the tractor method of keeping up with pickers has to be used.

Bin movement in the orchard

No. of trees	*Yield (bus/acre)*	*No. of bins/acre*	*Remarks*
75	220·0	13	All moved
	300·0	19	No movement
	337·5	21	17 bins moved
	450·0	28	No movement, 5 bins per 16 trees
	525·0	33	21 moved
	600·0	38	No movement
	750·0	46	All moved
48	528·0	33	No move, 7 bins/10 trees
	576·0	36	No move, 3 bins/4 trees
	960·0	60	No move, 5 bins/4 trees
27	405·0	26	No move, 16 bins/17 trees
	486·0	31	No move, 9 bins/8 trees

Full containers

The handling of full containers from the orchard can fall into the following methods: (*a*) palletized boxes or bulk bin handling from the ground, (*b*) pallets are placed on the trailer bed and then loaded with bushels to form unit loads, and (*c*) non-palletized handling of loose boxes. The first

Handling full containers from field to store—based on 20,000 bushels handled

Method	*No. of men*	*Equipment*	*Performance (Bus/man hr)*	*Distance (miles)*	*Costs (pence/bus)*	
					Man	*Machine*
A. Pallets put on trailer then hand loaded	3	1 tractor 1 trailer 1 fork truck	53 50 43	¼ ½ 1	0·92 0·96 1·10	0·96 0·94 0·98
B. No pallets	3*	1 tractor 1 trailer	43	1	1·10	0·40
C. Boxes palletized at point of pick or bulk bins	3*	1 tractor 1 rear carrier	64	¼	0·75	0·31
	2	1 tractor 1 rear loader 1 fork truck	96	¼	0·375	0·84
	2	1 rear fork 1 tractor 1 front loader 1 fork truck	96	¼	0·375	0·93
	2	2 tractors 2 trailers 1 front loader 1 fork truck	102	1	0·48	1·20

*hand loading of stores in C not applicable to bins

method is much superior, as will be seen in the last table. To maintain high performances it is necessary to place the full box transportation into zones of ¼ mile, ½ mile and over.

An increase in the numbers handled will immediately reduce the machine costs. This is of little benefit in the no-pallet system where labour and poor operator performance dominate the scene.

Some conclusions

Two-handed picking should be encouraged, especially picking from the ground. A 26–28 lb bag should be used for this purpose.

In the orchard planned distribution of empty containers is essential if unnecessary walking time is to be cut to a minimum. Also careful assessment of tree yield will help to indicate the best concentration of empty containers.

Finally, planned three-zone carting of full containers will ensure greater performance per operator hour, reduced unit costs and possibly a greater degree of quality control than previously experienced.

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Crystal Violet Vaccine

The supply of crystal violet vaccine for use against swine fever has been discontinued—as from 10th August. This step was foreshadowed in April this year, and has been taken because the use of vaccine can hinder the early recognition and elimination of herds infected with swine fever. In no part of Great Britain is there now any heavy concentration of infection and in consequence the value of vaccination to individual owners can no longer be regarded as outweighing the disadvantage which it represents in the national programme of eradication.

The number of outbreaks of swine fever in the first six months of 1964 was 261, compared with 836 for the same period last year.

Concurrently, the official Registered Vaccinated Herds Scheme has been brought to an end.

A second article by

G. F. Aronson

GUN LAW

• Liability for Accidents

LET us now consider the question of liability for shooting accidents. This depends on negligence—a term which continually crops up in the common law and which does not necessarily have the pejorative sense it has in everyday language, but means failure to exercise the standard of care which the law expects in the circumstances.

This standard varies considerably, but it is essential to realize that with things such as firearms which are inherently dangerous the law expects such a high standard of care indeed, as not to fall far short of perfection itself. If, as regrettably sometimes happens, someone is injured or killed as a result of the failure of the owner of a firearm to exercise this very high standard of care, the owner must expect to be held to be liable by the courts and to be ordered to pay damages, which may well be considerable. This is so not only when the owner is handling the firearm himself; it can also arise when he entrusts it to a third person, particularly if that person happens to be a child.

The gun of a son

This is illustrated by a case (*Newton v. Edgerley*) which was decided in 1957. The infant plaintiff had received an injury to his right leg when a shotgun which the defendant's son, aged 12 years, was carrying under his arm was discharged by the act of a third boy whilst all three were walking in single file through a wood. The defendant had instructed his son in the use of the gun, and, in particular, he had forbidden him to take the gun off the farm or to use it on the farm when other children were present. The son, as is the way of children, yielded to temptation and, disobeying his father's orders, took the gun off the farm with other children and accidentally shot another boy (the plaintiff) when they were walking in single file. Many people in these circumstances would say that the father had done everything he reasonably could to prevent an accident, but, nevertheless, the court held that he was guilty of negligence.

Lord Parker, the Lord Chief Justice, said '. . . In those circumstances, I take the view that in the exercise of reasonable care this father either ought to have prevented the son having this gun at all, or if the son did have the gun, he ought to have realized that the boy would sooner or later go out with others and, accordingly, he ought to have given him very careful instructions as to the use of the weapon if others were present'. So the father lost the case and was ordered to pay damages.

Air Guns and Shot Guns, etc. Act 1962

Since this case was decided, Parliament has enacted a new law, the Air Guns and Shot Guns, etc. Act 1962, imposing strict conditions subject to which air guns and shot guns may be entrusted to children.

Taking first the case of 'air weapons', i.e., air guns, air rifles and air pistols, it is now an offence to give such a weapon, or ammunition for it, to any person *under the age of 14*, and, what is perhaps a little hard, it is also an offence for a child under this age to accept either of these things as a gift. The Act then goes on to provide that no person *under the age of 17* may have in his possession an air pistol *in any public place* (this includes the highway), and moreover when in such a place air guns and air rifles must be covered with a securely fastened gun-cover in such a way that they cannot be fired.

Not only are gifts of air weapons to persons under the age of 14 unlawful, it is also unlawful for a person under that age even to have one in his possession, or ammunition for it. There is, however, an exception to this rule where the child is acting under the supervision of a person over the age of 21; but even so the weapon must not be used for firing a missile beyond the premises on which it is being used. Incidentally, the Act contains exceptions for members of approved shooting clubs carrying out target practice, and also for shooting galleries where the only firearms used are either air weapons or miniature rifles not exceeding ·23 calibre.

Turning now to shot guns, no person, *under the age of 15*, may have an assembled shot gun in his possession except while under the supervision of a person over the age of 21, or except while the shot gun is covered with a securely fastened gun-cover so that it cannot be fired. By a 'shot gun' is meant a smooth-bore gun having a barrel not less than 20 inches in length—in other words the type of gun for which a firearms certificate is not normally needed.

Infringements of the Act carry with them quite severe penalties—up to three months in prison or a fine of up to £20, or both—so it is not to be lightly disregarded. Moreover, the court may order the forfeiture or disposal of the weapon and ammunition.

Insurance

It is easy enough, heaven knows, after a shooting accident to say what should and what should not have been done, but what practical steps can the owner of a firearm take to prevent even the possibility of his being ordered to pay damages following a finding of negligence? Unquestionably, the wisest step is to take out a policy of insurance. For quite a reasonable premium (about 30*s*. a year) one can obtain complete cover against virtually all mishaps—including even the loss or theft of the gun itself—a valuable article

these days. To most people this will seem a small price to pay for peace of mind.

Enough has now been said, it is hoped, in this and my previous article, to set at rest the farmer's worst misgivings concerning the law relating to firearms and to shooting rights. Armed with his gun licence or game licence—in rare cases his firearms certificate—his tenancy agreement, his insurance policy, selected Acts of Parliament and (I had almost forgotten) his gun and ammunition, the farmer can set forth with high hopes of a good day's shooting!

Last month Mr. Aronson dealt with the need for gun licences and certificates, and with shooting rights

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The Ministry's Publications

Since the list published in the August, 1964, issue of *Agriculture* (p. 383) the following publications have been issued.

BULLETINS

No. 115. Commercial Glasshouses (Revised) 8*s*. (by post 8*s*. 7*d*.)

Deals comprehensively with all types of glasshouses and their construction, ventilation and heating systems, and choice of site and layout.

FARM MACHINERY LEAFLETS

No. 12. In-sack Grain Drying (Revised) 6*d*. (by post 9*d*.)

OTHER PUBLICATIONS

N.A.A.S. Quarterly Review No. 64. Summer 1964 (New) 2*s*. (by post 2*s*. 4*d*.)

Costs and Efficiency in Milk Production (New) 4*s*. (by post 4*s*. 4*d*.)
A report of the National Investigation into the Economics of Milk Production 1960–62

Single copies of Advisory Leaflets, up to a maximum of six different leaflets, may be obtained free from the Ministry (Publications), Government Buildings, Tolcarne Drive, Pinner, Middlesex. Copies beyond this limit must be bought from Government Bookshops (addresses on p. 444), price 4d. each (by post 7d.). Other publications are obtainable from Government Bookshops, from Divisional Offices of the Ministry or through any bookseller.

GRAIN DRILLS

H. R. SMITH • H. RICHARDS

WITH improved standards of fertility and cultivations, the seed rates recommended for cereal crops have been reduced during the past few years. The purpose of a grain drill is to sow the seed evenly and at the correct depth. It will only do the job for which it was designed when in good mechanical condition. A thorough check should be made before use and items such as defective coulter tubes and tension springs replaced to ensure evenness in sowing.

Although the instruction book gives tables of seed rates, there can be fairly wide variations caused by differences in the size of seed, its moisture content and the amount of foreign matter present, so it is wise to check sowing rates occasionally. Provision for calibration has been made on some drills by providing trays to collect the seed when the feed mechanism is operated by hand. Other drills can be checked similarly or by operating over one-tenth acre and collecting the seed in small bags from each coulter tube. By weighing and calculation the rate per acre can be determined. The number of turns of the wheel required for one-tenth acre will be:

$$\frac{484 \times 9}{\text{sowing width of drill (ft)} \times \text{circumference of wheel (ft)}}$$

When using a 13–15 row drill, accurate joins may be made by taking either the wheel marks of the tractor or the drill as a guide; with wider machines a correctly set marker will enable the tractor driver to make a good job of sowing.

To set the markers, attach the drill to the tractor and, with the hopper empty and the coulters in the ground, proceed on a straight course over the seedbed. This will leave the wheel marks of the tractor and show the outside coulter marks. Measure the distance from the mark of the front wheel to the mark of the outside coulter on each side. Add the distance between two coulters and set the marker this total distance outside the last coulter.

Time is of the essence

Time is often a most important factor during drilling. When ground conditions are favourable, careful management is necessary to keep the drill at work for the maximum time possible. As much work as is practical should be done along the longest side of the field; this will save time on the headland when filling from a fixed point, such as a trailer. If the trailer can be moved along the headland as the work progresses, so much the better. One man seeing to this, and also preparing the grain and fertilizer for filling the drill, is better employed than riding on the drill watching for blockages that should never occur.

Considerable time can also be saved by using a drill with the greatest possible sowing width, but the size of drill used will be controlled to some extent by the size and shape of fields, the soil and type of tractor. It should be remembered that the draft of the implement is directly proportional to the number of coulters in work, rather than the sowing width.

It can also speed up operations if grain alone has to be handled at planting time, and on soils in a high state of fertility the plain grain drill is often used—although there is experimental evidence that combine drilling is worth while in fields deficient in phosphate and potash.

A number of modern plain grain drills with close coulter spacings (around 4 inches instead of the more usual 7 inches) are designed to provide an extremely wide range of settings. The close-spaced coulters work well in a good, clean seedbed free from large clods and trash: to avoid blockages the coulters are usually arranged in two staggered rows with plenty of clearance to allow clods to pass between them.

The forward speed of drilling varies widely from farm to farm, and there seems to be no disadvantage in using a fairly high speed for force-feed drills. The extra ground covered in a given time at 6–7 m.p.h., instead of 4–5 m.p.h., is obvious, and when an output of 4 acres per hour or more is expected the work must be well organized, not only to keep the drill in work but also to maintain a reasonably high speed of travel.

A drill will not last long unless extreme care is taken to clean the mechanism and reduce corrosion. Never leave drills in the field with fertilizer or seed in the hopper; and preferably cover them with a sheet. At the end of the season special attention should be given to dismantling, removing fertilizer, seed deposits and rust, and finally, coating cleaned surfaces with an anti-rust oil before storage. Careful maintenance pays.

20. South Gloucestershire

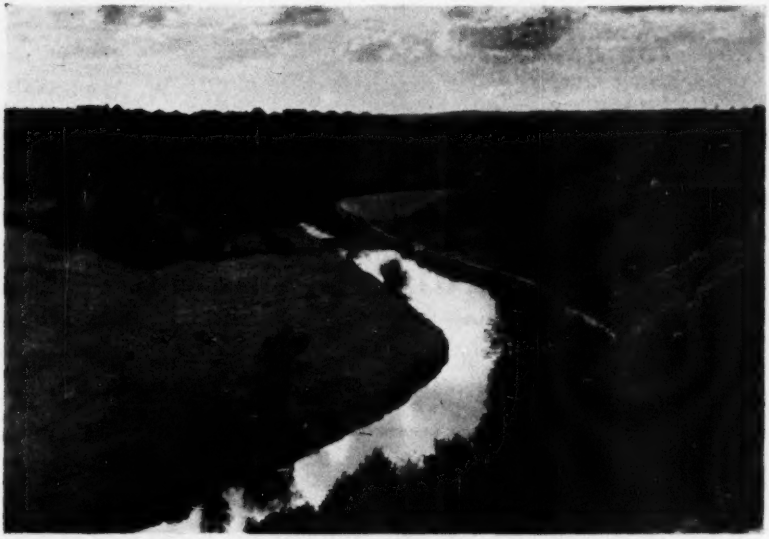
D. A. Ferraro

THE Chipping Sodbury district of Gloucestershire extends from the Somerset border in the south to Tetbury and Wotton-under-Edge in the north, a distance of 20 miles. Westward from the Wiltshire border it reaches well into the Severn Vale. The total agricultural area is 80,000 acres, of which 54,000 are grassland. Farms are not generally large; only 13 are over 500 acres, 81 between 200 and 250, 130 between 100 and 200, and 338 of less than 100.

The dominant feature of a geologically complex area is the Cotswold escarpment, running north to south along the Wiltshire border. Here, on limestone soils, between 350 and 700 feet up, are large farms and fields on which fully-mechanized corn growing predominates. On most farms some steep banks make a livestock enterprise essential—usually a dairy herd, although there are some ewe flocks and beef stores. Ley farming is standard practice and stocking rates are quite high.

In strong contrast is the parallel belt of lias clay on the west side. Farms and fields here are smaller and consist almost wholly of permanent pasture. Some of the swards are very good, but this intractable soil with its poor drainage results in much that is poor and scope for arable work is limited. Buildings, in the local stone, are often a problem, highlighted by the fact that milk production is the basic farm enterprise. With improved tractor power available, a tendency to more cereal growing is appearing, despite the difficulties of cultivating this heavy soil.

To the south and along the western edge are areas of red Keuper Marl. Though sometimes wet and difficult, there is a good deal that is light, free-draining stuff, and this has attracted a wide variety of market-garden crops. The land is steeply undulating, with sheltered valleys catching the sun and running down to the Avon, just above Bristol. The southern aspect and climate of this part give it a softness more reminiscent of Somerset than the harsh and colder parishes just to the north. It is also an area of small farms in which dairying is the chief source of income. As the photograph shows, it is beautiful country, though the growth of Bristol is now encroaching upon it.



The picturesque Avon valley, photographed from Panorama Walk, Hanham

The Friesian is everywhere the favourite breed. There are a few bail herds, but yard-and-parlour systems are preferred. Self-feeding of silage is not widespread and especially on the smaller Vale farms hay is still the principal winter food. As would be expected, the range of profitability is wide. Generally the Vale farm, with its low proportion of cereals and tendency to understock, cannot compete with the larger Cotswold farm so far as return on capital is concerned, though in both cases net farm incomes around £10 per acre are average. But with the increasing intensification of the smaller dairy farm, it is being demonstrated that in skilled hands the Vale farm is capable of high returns, with net farm income of £25 per acre and more from milk alone.

Coal was mined here until recently and the relics of this industry are still easy to find. Quarrying of lias and carboniferous limestone is very active and seems likely to flourish as the development of the area continues. Already there are nuclear power stations at Berkeley and Oldbury and extensive factories at Severnside, Avonmouth and Bristol, just beyond the district border. There will shortly be a new town at Yate in the centre of the area and new motorway links across the Severn Bridge from London to Cardiff and from Bristol to the Midlands. Farmers already facing losses of land, disruption of boundaries and the problems which close proximity to urban areas always brings, have now also to face competition for their labour from the attractions of factory hours and wages. This will be particularly hard on those medium-sized farms between, say, 80 and 200 acres where dependence on hired labour is considerable, but the opportunity to offer competitive terms is limited. These make up almost one-third of the holdings.

Despite the urban and industrial developments, this is still an agreeable and charming area with a rural life and character of its own.

W. MAGSON
Agricultural Land Service, Wolverhampton

Storing Grain on the Floor

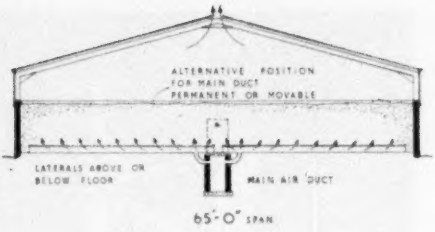
THE practice of storing pre-dried grain or drying and storing grain in bulk on the floor of a building is suitable for most farms where few different types of cereals are grown and the ultimate disposal of the stored grain is not complicated. Some think the system is not so safe as silo storage, where grain stored in relatively small quantities can be 'turned' in the silos. Nor can a completely 'press button' system of floor storage be devised, but fixed conveyors can sometimes be used as a step towards this. Advantages are the general-purpose nature of the storage building and the low capital cost—a suitable building costs about £1 per sq. ft, i.e., about £8 per ton stored, including some working space.

Grain is bulked on the floor of the building and dried by air distributed into it by a system of lateral ducts. These can either be built into the floor with covers through which the air passes, or be portable ducts made of metal or timber laid on the floor. Alternatively, floors of loose bricks carried on honeycombed sleeper walls are laid so that the whole floor area is level, the air passing through spaces between the bricks. A layout with portable lateral ducts 3 ft apart and up to 35 ft long, supplied with air from a main duct, either in the centre or along one side of the building, or in the centre in wide buildings, is most generally adopted.

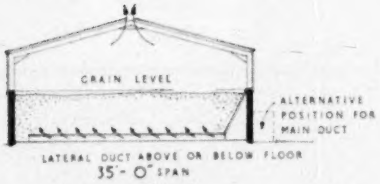
Certain types of existing farm buildings are suitable for floor storage provided the roofs are sound and the walls strong enough. Before using such a building advice on these points should be sought from a qualified person.

New buildings should be of the rigid-frame type, with frames strong enough to support the retaining walls, or rigid panel buildings. From the viewpoint of drying, handling and economic building cost, grain should be stored at about 7 ft deep with retaining walls about 8 ft high; above this the sides of the building can be cladded up to eaves level. Ample headroom is essential both at the door openings and within the building, and a clear minimum height of 15 ft is suggested.

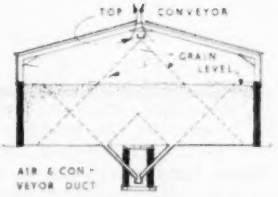
It is important that the building is dry, and this applies to site, floor, walls and roof. Snow will often penetrate where rain will not, and asbestos roofs with flat pitches should have the laps sealed and closure pieces at verges and



Central main duct



Side main duct



Part mechanical handling

eaves to keep out birds and driving snow. An adequate system for disposal of rainwater from the roof and the pavings around the building is essential, and valley gutters should be avoided if possible. Brickwork and concrete block walls are not always weatherproof and in exposed situations walls may need protection by cladding or rendering. The floor is a most important part of the unit and it is well worth spending time and money on the preparation of a firm base and properly laid concrete. A damp-proof membrane in the floor gives security against rising damp, and as heavily-loaded vehicles will be moving over the floor, a layer of steel reinforcement should be used in the concrete if there is any doubt about the stability of the ground.

If grain is retained by the walls of the building they must be strong enough to resist the grain pressures with a reasonable margin of safety. Where the grain is heaped on the main bulk there is a considerable surcharge on the walls and this also has to be considered. Methods of building walls are—(1) reinforced brick or concrete blocks between posts or buttresses; (2) post and panel walls of steel, concrete or timber, or a combination of these materials; (3) 'L'-shaped walls of the balanced cantilever type; (4) reinforced 'in situ' concrete walls; (5) mass walling.

Post and panel walls are an attractive form of construction and are available from various manufacturers. They can be fixed or movable or be free-standing units, which are useful for dividing up the storage area. Main air ducts made in a similar way are obtainable, designed for permanent installation or for temporary fixing to the floor.

Outlet ventilation of 1½–2 sq. ft for each 1,000 cu. ft for air through the fan is necessary and all openings should be bird-proofed. Sufficient natural lighting is needed for working in the building, with adequate artificial lighting, and the provision of ample power points for augers and other equipment will avoid long lengths of unprotected cable lying on the floor.

In many cases one of the main advantages of floor storage is the general-purpose nature of the building, and the possibilities of alternative uses should be considered in the siting and initial planning.

IN BRIEF

Black Scurf

Few potato crops are entirely free from the organism *Rhizoctonia solani*, recognized by the sclerotia or 'black scurf' on the surfaces of the tubers, but in general the fungus is considered unimportant provided cultural conditions are good. However, in certain seasons appreciable damage can occur during chitting (particularly in areas such as Pembrokeshire) as well as after planting. Damage due to *Rhizoctonia* is likely to increase in importance as potato growing for specialized markets becomes more competitive. Because of this investigations have been carried out at the University of Nottingham School of Agriculture, aimed at exploring how certain environmental factors influence the association between fungus and potato plant.

An extreme example of the damage which occurs during chitting is shown in the photograph. Hyphae have grown out either from the black sclerotia or from individual resting hyphae which were present on the tuber surface at lifting, grown up the young shoots and penetrated and killed the tips. Experiments on tubers kept at different controlled temperatures and relative humidities have shown that this type of injury occurs over a wide range of temperature, provided conditions are very damp; that is, where humidities are above 93 per cent and there is some condensation of water during part of the day and night. Light reduces the amount of attack or, if sufficiently intense or continuous, prevents it. We have evidence to suggest that light probably has a slight heating effect on the potato shoots and retards condensation unless the surrounding atmosphere is very humid. In the field, emergence of plants which have been attacked during storage is delayed by as much as 4–6 weeks; the presence of hyphae on apparently uninjured shoots has a similar, though smaller, effect.

Irrigation studies showed that *Rhizoctonia* grows more rapidly over shoots in dry than in wet soil, so that lesions appear sooner in the former. After the shoots have emerged and their underground parts have toughened, *Rhizoctonia* does little further damage to them, but it continues its activity on stolons. It penetrates and kills some of these, while on others it grows along the surface and reaches the young tubers where the resting stages are formed. Usually, higher proportions of the young tubers are infected in dry than in wet soil. *Rhizoctonia* can live and grow in soil in the absence of potato plants, but attack usually starts late when the seed tuber is not infected, because hyphae living in the soil have further to grow before they reach the susceptible parts of the plant. If the soil is wet they may never reach such parts.

Some practical implications of this work can be indicated briefly here. Hyphae which have grown on to potato shoots are not easily killed by a change in conditions; it is important, therefore, that they should not be allowed to commence

Potato shoots (variety King Edward) attacked by Rhizoctonia during chitting. This can happen when the environment in chitting houses favours dampness, e.g., poor ventilation leading to condensation

growth during chitting. Attention should be paid to measures which reduce dampness in chitting houses; for example, to increased ventilation, particularly increased air movement amongst the tubers, and avoidance of sudden temperature fluctuations to prevent condensation. Provision of adequate lighting at all times is helpful, and the practice of switching on artificial lights at night has the additional advantage that it helps to prevent a temperature drop. Field trials at Sutton Bonington have not been on a scale large enough to determine the effects of the disease on yield, but it seems that irrigation might be of value to those who grow potatoes for seed, or to others who wish to avoid the unsightly appearance of sclerotia on the tubers. Early lifting also helps to reduce the number of tubers infected. However, further work on these aspects will be required before any firm recommendations can be made.

J. E. Mordue

Licences for A.I. Pigs

Regulations which come into force on 2nd November bring under strict control the practice of artificial insemination of pigs. The idea is to prevent the spread of animal disease and ensure that boars which are widely used in this way have the necessary breeding merit. Accordingly the Regulations prohibit the distribution or sale of boar semen without a licence from the Minister except in three cases: insemination of a sow with semen owned by the same person, sale or transfer of semen by the old owner to the new owner of the boar, and delivery to and re-delivery from a veterinary surgeon or practitioner or an artificial insemination centre for the purpose of storage.

Licences will be granted, subject to specified conditions, for the distribution of semen from artificial insemination centres and also for distribution from privately-owned boars. As regards the centres, the Regulations provide that the collection, processing and storage of boar semen and insemination with the semen must be under the effective supervision and control of a veterinary surgeon approved by the Minister; and that any person employed by the licensee in such operations must be approved, as must be the premises. Provision is made for the prohibition of the distribution or sale of unsuitable semen and for restrictions on the collection, movement and use of semen in certain areas subject to foot-and-mouth disease and swine fever.

The control exercised through Regulations will be generally similar to that over A.I. of cattle. All boars will be examined by both veterinary and livestock husbandry officers before approval is given for their use in artificial insemination.

Anyone who wishes to apply for a licence to operate an A.I. centre for pigs in England and Wales should write to the Ministry (Livestock Improvement Branch) at Great Westminster House, Horseferry Road, London, S.W.1. Applications for licences for the sale or distribution of semen from privately-owned boars should be made to the same address. In Scotland, application should be made to the Department of Agriculture and Fisheries for Scotland (Livestock Improvement Branch), Broomhouse Drive, Edinburgh 11.

Reduced Cultivations in Cereal Growing

Earlier attempts on the Ministry's Experimental Husbandry Farms to grow arable crops without ploughing resulted in very low yields, due largely to intense competition from those weeds which were not then controllable by herbicides. But recently, with complete weed control made possible by chemicals, the necessity and desirability of traditional cultivation practices is once more in question.

The situation is particularly interesting in the case of cereal crops. Unlike that of root crops, the harvesting of cereals does not disturb the soil. So if ploughing can be avoided, there is then the possibility of restricting soil disturbance to a shallow horizon only a little deeper than pressure drilling depths. In time weed seeds could be eliminated from such an horizon.

With the help of the Weed Research Organisation, new studies are now beginning on several Experimental Husbandry Farms to examine ways of exploiting the situation. As a preliminary investigation in the first year, four principal methods of getting the seed into the ground have been compared. The first, as a 'control' method, is conventional ploughing and seedbed preparation, and normal farm drilling. The other three methods follow the killing of existing vegetation, whether grass sward or weeds in stubble, by a non-residual weed-killer. The three 'reduced' cultivation methods are normal farm drilling after shallow (3 in.) discing or rotavation, disc seeding or slit seeding. There is, of course, some soil inversion with rotavation or discing and with disc seeding, but none with slit seeding.

The trials are in progress on the full range of soil conditions covered by the Experimental Husbandry Farms as represented by Gleadthorpe (light land), Bridget's and High Mowthorpe (medium soils) and Rosemaund and Boxworth (heavy land). There are parallel studies on the light land farms of the Weed Research Organisation and the Norfolk Agricultural Station.

Generally, machine performance and the resulting brairds in the first autumn, have been encouraging, but the suitability of the various machines for the different soil conditions will be taken into account in planning the next stage of the investigations. This will consist of growing several successive cereal crops by conventional or 'reduced' cultivation. Problems of compaction by harvesting machinery may be important here.

Fruit—Handle with Care

A ten-minute colour cartoon, musical film, 'Be Careful Boys', sponsored by the Fruit Producers' Council, is aimed at reducing waste and damage in the handling of fruit and other horticultural produce between growers and consumers. This light-hearted film carries a serious message to all produce handlers and is, we understand, merely the spearhead of a calculated campaign being mounted by the Council.

The film can be borrowed free from Public Relations Associates, Ltd., 67 Brook Street, London, W.1.

Books

Dairy Cattle Feeding and Management (Fifth edition). P. M. REAVES and H. O. HENDERSON. John Wiley and Sons. 75*s*.

This American text-book, already known to readers in this country, presents an up-to-date picture of American dairy farming today—with its 18 million dairy cows (compared with 2¾ million in England and Wales) and a level of liquid milk consumption of 47 per cent of total output, with an average output per cow of 737 gallons. Against this statistical background, the pattern of dairy farming is outlined, with trends similar to those current in Britain, as shown by greater emphasis in the text on better quality fodder production and improved pasture management. But there is nothing new here for the British farmer.

Feeding practices are fully described, using the T.D.N. Feeding Standards devised by Morrison, and there is a useful discussion of two problems in applying feeding standards which have received attention by research workers here, namely the higher maintenance requirements of cattle whilst grazing and the increasing requirement in feed nutrients per gallon with increasing yield.

The improvement of dairy cattle by sire selection based on dairy herd testing (milk recording) receives full attention, as does artificial insemination, which operates over 40 per cent of the national herd (7¼ million cows). It was interesting to read that 'contemporary comparison' systems of evaluating proven sires is superseding earlier 'sire index' systems based on dam/daughter comparisons. Further chapters devoted to breeding pedigree cattle contain much sound advice.

I was particularly interested to determine to what extent American practice could offer help to the British farmer in respect of mastitis control, herd fertility, and milking techniques, but there is no new material that is not already known in this country. Indeed, no mention was made of phased pulsation systems or of teat-cup disinfection in mastitis control. Likewise, in the chapter on the housing of dairy cattle, admirable as it may be, the description of American practices offers little of help to the progressive dairy farmer here.

But such disappointments do not detract from the merit of this publication as a text-book; it is clearly written with copious references, and to agricultural students will have considerable appeal as a work of reference to modern dairy husbandry practices in the U.S.A. For the British dairy farmer there is the consoling thought that research in this country in milking techniques, milking parlour design, new housing systems and effluent disposal is certainly abreast of American practice, and in the sphere of dairy farm management techniques well ahead in the advisory field.

K.N.R.

Virus Diseases of Apples and Pears. Commonwealth Agricultural Bureaux. 35*s*.

Pome fruits are important in many temperate countries. In recent years knowledge of virus diseases of apples and pears has greatly increased, and since the research has been carried out at several centres in Europe, U.S.A. and Canada, a need has arisen for a compilation of present knowledge in the form of a collaborative text. This book amply fills the need.

Twenty apple and nine pear virus diseases are described clearly and concisely under the headings of common names, geographic distribution, symptoms, transmission and general remarks. The common names are given, where applicable, in five languages, Danish, Dutch, French, German and Italian, and reference is also made to diseases in other varieties probably caused by the same virus. The use of synonyms should reduce confusion in nomenclature. There are descriptions of other disorders of apples and pears, believed to be genetical and whose symptoms could be confused with virus diseases. One chapter considers the economic importance of virus diseases, while another reviews control measures.

The book is presented in loose-leaf form. Since it is proposed to issue additional sections and amendments as new information becomes available, this form is most convenient, allowing the text to keep pace with current knowledge of the subject. The illustrations of symptoms are plentiful and include several colour plates of high quality prepared by Plantenziektenkundige Dienst.

The bibliography, with over two hundred references, contains all the leading work of more recent years on pome fruit viruses.

This book is one of wide application to plant pathologists and horticultural specialists. The quality of the contents does great credit to the contributors, especially to its editor, Dr. Posnette, East Malling Research Station, for the way it is presented.

R.H.C.

The English Lake District. MOLLY LEFEBURE. Batsford. 25*s*.

I live in the Lake District and in the summer I am greatly inconvenienced in my travels by visitors to the area viewing the hills from crawling cars.

So I recommend this book wholeheartedly—for to make the most of its information the reader must leave his car and walk and climb—not sit in it all fugged-up at some beauty spot reading the Sunday papers—with every likelihood of becoming the originator of a legless race.

And away up the fells you could meet the farmers and shepherds who, according to Molly Lefebure, may possibly be descendants of a war-like tribe called Brigantes, who were occupying the Lake District before the Romans came. But she also suggests it was the Norsemen, who came several centuries later, who introduced the Herdwick sheep—surely the smallest and most pathetic looking sheep of the thirty-three breeds in Britain.

Happily, I noted that Borrowdale is mentioned as a wet place. It certainly is and it's not many miles from Keswick, which always looks well washed.

Unhappily, I noted that the word 'clarty' is mentioned, meaning thick, gooey mud. In my village, in the Cumberland part of the Lake District, it is very difficult to understand what the village children are saying. It is far from being an attractive dialect.

The black-and-white photographs are adequate, but only that; frankly only colour can do justice to the Lake District, as the book's cover photograph shows.

But Miss Lefebure's book is full of lively, well-informed gossipy stuff about past Lakes characters, which adds to the enjoyment of the present.

Of the future of the Lake District, I have long felt it should be designated as Britain's first area from which cars would be banned, or second after Sark in the Channel Islands.

It is not a large area, and it is quite terrifying on the main road from Kendal through Windermere and Keswick to Cockermouth because of the heavy lorries and tankers bashing through the narrow, twisting roads to West Cumberland. That traffic should all go via Penrith; in the Lake District only horse-drawn vehicles should be allowed.

What a delightful place it would then become, and what a lot of pleasure it would give to countless people seeking respite from petrol and diesel engines.

G.W.R.

The Pig Farmer's Veterinary Book. NORMAN BARRON. Farming Press. 30*s*.

Dr. Barron's book is, by now, too well known to need introduction, and the appearance of the fourth edition bears witness to its popularity as well as to the author's assiduity in trying to keep it right up to date. The present edition includes a number of the 'new' diseases, such as 'XI disease' as well as the perennial scourges. But the main emphasis, as in previous editions, is justifiably placed on the recognition and avoidance of disease and the factors which predispose to it. By disease, Dr. Barron understands not only infectious diseases, but any departure from optimal health which is likely to affect the productivity of the pig and the profitability of the enterprise, and he includes a good deal of excellent advice on feeding, housing and management in this connection.

It would be unreasonable to expect a book to provide, within such a modest compass, an exhaustive guide to the diagnosis, prevention and treatment of all pig disease; the aim is rather to provide the pig keeper with a background of reliable information which will help him to avoid loss wherever possible, and to recognize the situations in which expert attention or advice may be needed. Nevertheless this book will tend to become the *vade-mecum* of the 'do-it-yourself' brigade, and it is disturbing to find that the reader is still advised to make injections into the most valuable parts of the pig's carcass, and not warned about the necessity for sterilizing needles and syringes.

The book is well printed on good paper, the illustrations are clear and helpful, and the price is the approximate equivalent of one baby piglet saved.

J.T.D.

Records for Profitable Farming. G. H. CAMAMILE and T. W. D. THEOPHILUS. Hutchinson. 21*s*.

Clearly and simply written by a chartered accountant and an experienced farm management adviser, this is an important book which is going to have a major impact on farming in the next few years. In all the chapters there is an air of quiet authority, suggesting long experience with the subject and complete mastery of it.

What is the message? It is simply that, since records of various kinds must be kept, it is worth the farmer's while to use them to maintain a firm financial control over his farming activities and destiny.

The first chapters explain the techniques of account analysis, farm planning and budgeting. These subjects have been covered many times before, but rarely have they been described so precisely with such clear examples. An admirable balance has been maintained between the account analysis technique and gross margin analysis—subjects which can be guaranteed to generate heat in less well-informed discussions.

Then comes the meat of the book, on budgetary control and the comparison of budgeted performance with the financial out-turn. It is no theoretical treatise. Numerous practical examples are included to show exactly how the system can be introduced into a farm business, and there are many pearls of wisdom scattered throughout the chapters to gladden the heart of the discerning reader. The suggested system is somewhat elaborate, however, for farmers just on the threshold of recording for management purposes. A less-than-perfect system might be adopted by those with little experience in management accounting.

It is, in fact, a compliment to the authors that the book is extremely valuable, even if these central chapters are skipped at first reading; for later chapters describe in essentially practical terms such topics as how to start an organized filing system, how to keep adequate records of cash payments, how to keep simple wages records with a minimum of book-keeping, what physical records might be kept for individual enterprises, and so on. There is a particularly interesting section on 'The Farm Ledger,' describing a book-keeping system rather simpler and easier to operate than the more generally-accepted cash-analysis system.

The suggested method could be thoroughly tested on farms of different types and sizes during the next year or so; it may well prove satisfactory for the majority of farmers in the country.

This is one of the reasons the book is going to have a major impact: its suggested methods may be widely adopted during the next decade. Its other great virtue is in describing to students—and practising farmers—exactly how to set about keeping satisfactory records for profitable farming.

K.D.

Cornwall: A Shell Guide. JOHN BETJEMAN. Faber and Faber. 15*s*.

The first Shell Guide to Cornwall was published in 1935; the new volume by the same author contains much new material and many shrewd observations on the changes wrought in the intervening years.

Tourism, now the biggest single industry in the Royal Duchy, has created many new problems; chalets, caravans and coastal development all incur the author's wrath, and the Electricity Board does not go unscathed. In spite of this, solitude and beauty can still be found in abundance after diligent search, aided by this Gazetteer. The parishes are arranged in alphabetical order and briefly reviewed; the topography is noted, the public buildings inspected and observations made on prosperity past and present. Attention is drawn to prominent features of the landscape and comparisons made with other times and places. The author's interpretation of architectural style and beauty may not appeal to all readers, but his skill in the presentation of structural detail of the many fine churches and chapels show the hand of an artist as well as that of a writer.

At some personal risk, the author has included the Isles of Scilly in this Guide to Cornwall; he comments favourably on the friendliness of the Islanders, and the opportunities for holiday-makers. The architecture of the Isles he dismisses without comment, but pays a well-earned tribute to the work of Augustus Smith and his successors in developing the Island economy.

The book, edited jointly by John Betjeman and John Piper, is well printed on good quality paper and profusely illustrated by excellent black-and-white photographs taken mainly by Piper. A map (¼ in. scale), with a superimposed grid, will help both the visitor and the resident to use the book to best advantage, and to learn to know and love one of the last carefree counties in England, fast disappearing under the joint assault of holidays with pay and motorways.

G.H.H.

Electricity for the Grower. Electrical Development Association.

The introductory words in Chapter 1 in this publication stress how essential it is to have electricity on a modern horticultural holding. The hundred or so pages which follow leave one in no doubt on this point, and it will probably be a revelation to most readers to find out how many ways electricity can be used to advantage on a glasshouse holding. The particular merit of this 'servant' is that it is so amenable to automatic control. If lights have to be switched on or off in the middle of the night, or a boiler started up at some unearthly hour, all that is necessary is to give the required instruction by setting the time clock or other control. Unless a power cut occurs, the job will be done on schedule.

The publishers have collected information from many reliable sources, and no aspect of the use of electricity on the holding has been overlooked. It is pointed out, however, that new uses are continually being discovered.

Not unnaturally, electricity as a source of heat receives priority, and many methods of heating glasshouses, frames and mushroom houses are discussed in detail. Under the heading 'Question of Costs', information is given on how costs are estimated, but no comparison is made with heat obtained from other sources. So far as space heating is concerned, it is probably fair to say that the grower pays rather heavily for the convenience of heating by electricity.

Light sources are dealt with, and the effect of light on a wide range of crops is set out in detail. The very great economic effect of having adequate light on the job during working hours is emphasized, and there is no doubt that installation for this purpose only can pay off handsomely.

Without exception, the other uses described can be fully justified by the saving in labour and the gain in efficiency that can be obtained. For example, automatic ventilation on a tomato crop, even if it costs as much as manual operation, does the work so much more precisely that an improved crop is almost certain to result.

The booklet, which may be obtained from the Electrical Development Association, 2 Savoy Hill, London, W.C.2, or from Regional Electricity Board Headquarters, contains many excellent illustrations which add considerably to its educational value. It can be confidently recommended as worthy of study by every grower, for the increased use of electricity on a holding is almost certainly going to result in a greater margin of profit.

A.D.H.

Kent Wild White Clover. R. J. HAGGER and W. HOLMES. Wye College. 5*s*. (*inc. postage*).

Sub-titled 'The growth and management of Wild White Clover with special reference to seed production', this 40-page report describes traditional seed production practices in Kent and summarizes the results of experimental work carried out at Wye College by the authors from 1958 to 1963. It contains a list of over 50 references on white clover.

The emphasis throughout is on the importance of timing, both in relation to the 'shutting up' of fields for seed production and in relation to the time of harvesting. The optimum time of shutting up is shown to be about 15–20 days after the first appearance of flower buds. The optimum date differs from year to year depending on spring temperatures, but will usually vary between 20th May and 7th June. Most growers continued grazing until well after the recommended dates, and the authors consider that seed yields could be raised by earlier shutting up.

The studies on harvesting suggested that an increase in seed yield of over 50 per cent will often result from postponing the harvest one week beyond the normal maturity stage for harvesting, i.e., 80–90 per cent of heads brown and reflexed.

In his foreword, the Principal of Wye College expresses the hope that the report will be of value both to research workers and to practising farmers. Research workers will find a comprehensive review of the literature on wild white clover, and a particularly interesting section on the seasonal development of the clover plant.

The farmer who grows white clover for seed will be comforted to learn that his traditional methods have been shown to give very satisfactory yields, provided the sheep are removed at the right time. He will, however, gain little comfort from the statement that in some years only 50 per cent or less of the potential seed yield present at the time ot harvest is actually harvested.

D.A.

Animal Anaesthesia. Volume I. WESTHUES and FRITSCH. Oliver and Boyd. 45*s*.

Animal Anaesthesia by Westhues and Fritsch is to be published in two volumes, the first dealing exclusively with local anaesthesia. The introductory chapters are concerned with the physico-chemical properties and mode of action of a wide

variety of local anaesthetic agents besides the general methods involved in carrying out infiltration and regional anaesthesia. The main body of the book is concerned initially with the anatomical landmarks and the techniques involved in the injection of local anaesthetic agents into joints and tendon sheaths, and then passes on to consider regional anaesthesia of the head and limbs.

Many of the techniques described to enable the operator to block specific sensory nerves in the head appear to be extremely hazardous, unless their use is limited to the most phlegmatic of patients. It is suggested in the introduction that local anaesthesia is often carried out in combination with sedatives or tranquillizers, but the use of muscle relaxants as mentioned by the authors as a method of control, will not be acceptable to the majority.

Regional anaesthesia of the limbs is probably a more familiar technique in this country, and is frequently used as an aid to diagnosis and for the operations on the extremities, including anaesthesia of the digital nerves in the cow prior to amputation of the digit.

The sections dealing with the well-known techniques of paravertebral and extradural (epidural) anaesthesia are comprehensive. Firstly, they consider the distribution of the sensory nerve supply to the perineum and abdominal wall, and then the method of locating and blocking the individual nerves concerned. In cases where there is danger of the epidural anaesthetic inducing inco-ordination of the patient by affecting the lumbo-sacral plexus, alternative techniques are described for anaesthesia of the perineum, vulva and penis. Castration is dealt with in some detail, and finally methods are discussed for the blocking of certain peripheral sympathetic nerve trunks. These techniques aim at producing hyperaemia of those parts of the body that are peripheral to the point of application of the anaesthetic, and success from these methods is claimed in the relief of painful and inflammatory symptoms, particularly of the extremities.

The book is well produced and illustrated by many excellent drawings and photographs. Great credit is due to David Weaver for his most readable translation. With the increasing understanding of general anaesthetic methods, much of this book is of purely academic interest. General anaesthesia provides immobilization as well as freedom from pain, and this in turn frees the operator from the danger of serious injury which is so easily inflicted by a frightened and unco-operative patient. Whatever views one may hold on the desirability of local anaesthesia, Westhues and Fritsch have written a unique book on a series of exacting techniques, many of which have a wide application, particularly in large animal surgery.

R.W.

Danish Dairying. EINAR O. PETERSEN. Translated by G. H. WILSTER, Technical Dairy Publishing House, Copenhagen. 37*s.*

There has long been the need for a book such as this, which gives concise information on Denmark's dairy industry and gives it in English.

The first edition of *Danish Dairying*, published in 1956, was out of print within twelve months. This, the second edition, has the same aim and scope as the first, but the contents have been revised and figures and tables brought up to date. Where developments have been made, as, for example, in packaging dairy produce, the text has been rewritten. Containing one hundred and fifty-two pages and well illustrated, it is succintly written and excellent use is made of the twenty-eight well-designed tables. There is no index, but the subject matter is divided into sections and sub-sections whose titles are set out clearly in a table of contents.

The book opens with statistical information about the geography and climate of Denmark, and about its population and their occupations. Early sections are devoted to general aspects of dairy husbandry, and sub-sections include land ownership, the co-operative movement, the high level of agricultural production, breeds of dairy cattle, butterfat recording, feeding methods, disease eradication, transport and the payment for milk on a quality basis.

Denmark has not always been a dairying country, and the transformation from arable to dairy farming is described in a section containing historical information about the various contributing factors, notably the invention of the cream separator and the formation of co-operative creameries.

The rapid development in milk production and in the manufacture of dairy products created a demand for buildings and equipment, and a later section describes the growth of the Danish dairy engineering industry to meet not only home demands but also those of a flourishing export market.

The greater part of the book is concerned with the manufacture of specific dairy products, and succeeding sections are full of interesting and informative details on butter, cheese, processed cheese, ice cream, condensed milk and dried milk products. Despite the use of so much milk for manufacture, there appears to be no shortage in Denmark, and the story of milk for the liquid market has a section to itself.

Final sections cover Government control of milk and milk products, systems of education and training for would-be entrants to the dairy industry, research and experimentation within the industry, and organizations and societies concerned with dairying in Denmark.

H.R.C.

Received

Experiments in Progress—Number 16—Annual Report for 1962-63. The Grassland Research Institute. 10s.

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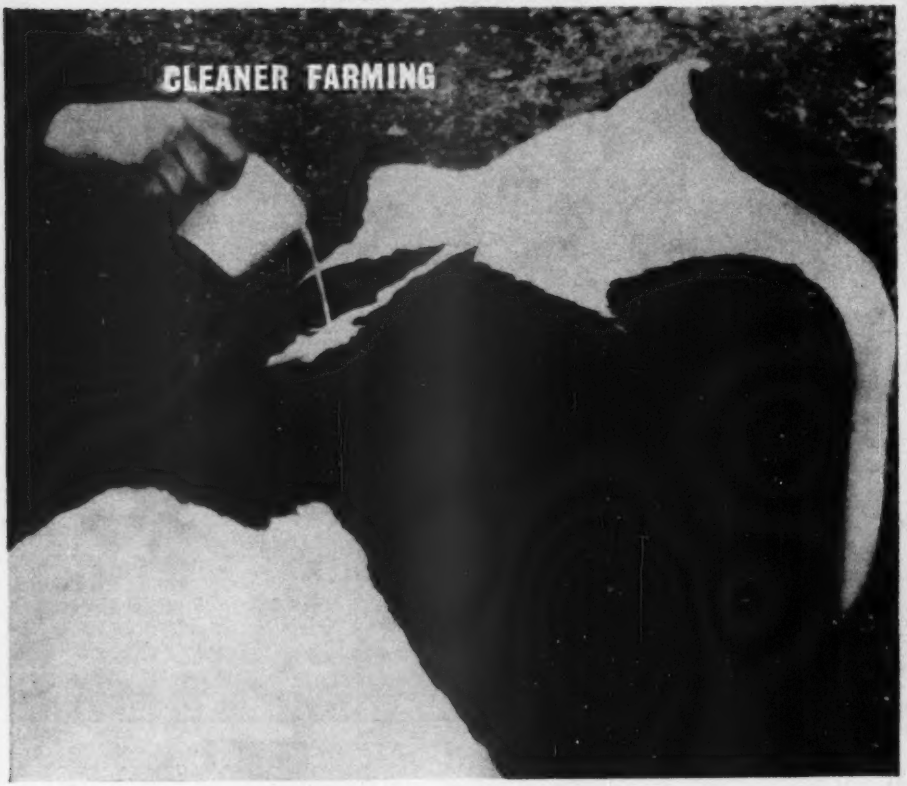

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